

TN

Department of
Health



Childhood Asthma in Tennessee

2007 - 2016

Tennessee Department of Health | May 2019





TENNESSEE DEPARTMENT OF HEALTH

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The mission of the Tennessee Department of Health is to protect, promote and improve the health and prosperity of people in Tennessee.

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Key Findings

Prevalence of Asthma, Tobacco Use and Tobacco Exposure

- Prevalence of current asthma among Tennessee children was **5.9 percent** in 2016.
- Current asthma prevalence was higher among males than among females.
- Current asthma prevalence was higher among black non-Hispanic children than among white non-Hispanic children.
- In 2016, the percent of children in Tennessee who lived in households where someone uses tobacco was **24.8 percent**, compared to **16.2 percent** nationally.
- Among children with public insurance, **41.3 percent** were reported to live in households where someone smokes compared to **15.0 percent** of those with private health insurance.
- The percentage of mothers who smoked during pregnancy in 2016 was **13.4 percent**.

Health Care Utilization and Cost

- Annually from 2007 to 2016, there were approximately **1,569** inpatient hospitalizations and **14,663** emergency department visits for asthma among children in Tennessee.
- In 2016, the inpatient hospitalization rate for primary diagnosis of asthma was **63 per 100,000**. The emergency department visit rate for asthma was **942 visits per 100,000**.
- Males had a higher inpatient hospitalization rate and emergency department visit rate compared to females.
- Black children had higher inpatient hospitalization and emergency department visit rates than white children.
- Metro Shelby County had the highest inpatient hospitalization rate and emergency department visit rate among Tennessee Health Department regions.[#]
- In 2016 hospital charges for childhood asthma in Tennessee totaled **\$45.3 million**.
- Per visit charges for both inpatient hospitalizations and outpatient visits increased over **100 percent** between 2007 and 2016.
- The per visit inpatient hospitalization charge averaged **\$12,007** between 2007 and 2016 while the per visit outpatient charge averaged **\$1,742**.

Asthma Among TennCare Enrollees

- The prevalence of asthma among children enrolled in TennCare was **15.1 percent** between 2014 and 2016.
- Asthma prevalence was highest among children 5-10 years old.
- Metro Hamilton County had the highest prevalence rate for asthma among children enrolled in TennCare.[#]

[#] Thirteen regions designated by the Tennessee Department of Health include seven rural and six metropolitan regions. See Appendix (page 52) for detailed Health Department region grouping and a map of the regions.

Key Findings

Racial Disparities

- More white women smoked during pregnancy than black women.
- There was a decline in hospitalization for asthma for all children across all racial groups however, black children continued to be hospitalized at a higher rate.
- Black children ages 1-4 had the highest inpatient hospitalization rate.
- Black males had the highest rate of hospitalization compared to other males and females.
- Disparities persisted in emergency department visit rates between black children and white children.
- There was an increase in the emergency department visit rate for black children.

Tennessee State Health Plan

The Tennessee Department of Health is required by state legislation to prepare and publish an annual update to the Tennessee State Health Plan.

<https://www.tn.gov/health/health-program-areas/state-health-plan.html>

The plan has evolved over the years to define a plan for health, not just health care, by addressing three guiding questions:

- Are we creating optimal health for all? (identifying and addressing disparities)
- Are we moving upstream? (primary prevention)
- Are we learning from and teaching others? (performance excellence)

In addition to incorporating these questions as a framework for the plan, the plan also reports on 12 key health indicators known as “Vital Signs,” which were selected and defined through an extensive year-long process of public input.

In addition to these 12 indicators, the Tennessee Department of Health is required to collect and report data on many other health conditions, including child fatalities, immunizations, traumatic brain injuries, cancer rates, etc. This report focuses on childhood asthma, which contributes to child fatalities, avoidable hospitalizations and emergency department visits, and other issues such as limited physical activity for children whose asthma is not well-controlled.

Tennessee’s Vital Signs are reported on a public dashboard at <https://www.tn.gov/health/health-program-areas/tennessee-vital-signs/redirect-tennessee-vital-signs/redirect-dashboard/dashboard.html>

Introduction

Asthma is a common chronic illness among children in the United States (U.S.). According to the Centers for Disease Control and Prevention (CDC), asthma is a disease that affects lungs, causing repeated episodes of wheezing, breathlessness, chest tightness and nighttime or early morning coughing. In 2016, 1 in 12 children had asthma, equaling 6.1 million children nationwide. More than half of the children with asthma had one or more asthma attacks a year and in 2015, asthma was responsible for approximately 1.7 million visits to emergency departments for children. Asthma was also responsible for over 13 million missed days of school and 14 million missed days of work to care for a child in 2013.^{1, 2, 3}

The Tennessee Department of Health's *The Burden of Asthma in Tennessee* was published in 2008, detailing the impact of asthma within the state by examining asthma prevalence, healthcare utilization, and mortality. The report also provided information on health disparities among people with asthma.⁴

In 2012, the Tennessee Department of Health published *The Burden of Asthma in Tennessee 2001-2010*, updating asthma data. Key findings from this report indicate that between the years 2001 and 2010, overall asthma inpatient hospitalizations for children decreased. Emergency department visits for children decreased for older children and in 2010, the prevalence of asthma among Tennessee children was 9.5 percent.⁵ In 2015, the Tennessee Department of Health published *Childhood Asthma in Tennessee, 2003-2012* which provided data on prevalence, healthcare use and costs related to childhood asthma, and asthma among TennCare enrollees aged 1 to 17 years.⁶

This document is an update on the impact of asthma on Tennessee children. The data covers the years 2007 to 2016 and is a supplement to the childhood asthma information provided in the previous reports. The information provided in this report and previous asthma reports are intended to inform childhood asthma management efforts in Tennessee.

Introduction

What is Asthma?

Asthma is a chronic disease of the lungs where inflammation of sensitive airways make it harder to breathe. During an asthma episode, a trigger causes the airways of the lungs to narrow or become blocked so air can't get into the lungs and breathing becomes very difficult. Attacks can be mild, moderate, or even life-threatening.^{1, 7}

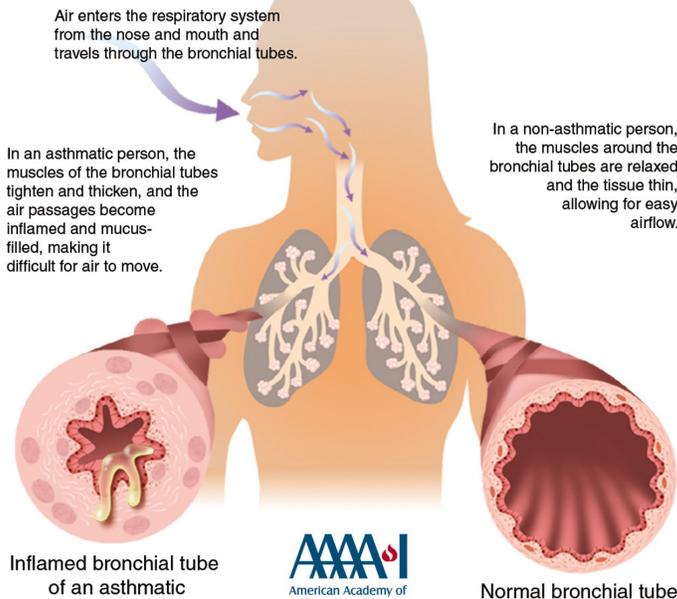
During an asthma episode, a person with asthma may cough, wheeze, have trouble breathing, or feel tightness of the chest.⁷

In an Asthma Attack⁷:

- The airway's lining swells and becomes further inflamed.
- Mucous clogs the airways.
- Muscles tighten around the airways.
- These changes narrow the airways until breathing becomes difficult and stressful.
- It is described as "trying to breathe through a straw stuffed with cotton."

Who is at Greatest Risk for Asthma?⁸

Why asthma makes it hard to breathe



Children: Asthma is twice as common among children as adults.

Minorities: Blacks have the highest death rates from asthma.

Risk factors for developing childhood asthma include allergies, family history of allergies and asthma, frequent respiratory infections, low birth weight, exposure to second-hand smoke before and after birth, and growing up in a low income, urban environment.

Revised 2010

Introduction

What Triggers an Asthma Attack?

Asthma triggers vary from person to person; however, respiratory illnesses are the most common asthma trigger in children. Other common asthma triggers include irritants in the air such as tobacco smoke and air pollution, and substances that cause allergies (allergens), such as dust mites, cockroaches and their droppings, pet dander, and mold. Exercise and feelings of excitement, fear, anger or sadness may also lead to an asthma attack.^{1,7}

How is Asthma Treated and Controlled?

Asthma is controlled by taking medication as prescribed and by avoiding triggers such as tobacco smoke. Long-term control medications help prevent and control asthma symptoms and should be taken every day. Quick-relief medications act fast and should be taken at the time someone is experiencing an asthma attack. Children with asthma should always leave their doctor's office with an "Asthma Action Plan", which can be shared with caretakers and the child's school. An asthma action plan helps the child and caretakers know the signs of an asthma attack, and provides personalized directions on when to use an inhaler and when to go to the emergency room. Good asthma control can reduce the frequency of attacks, reduce wheezing and coughing, enable better sleep, reduce missed school days and reduce hospitalizations for asthma.⁹

Asthma Attack Prevalence^{10, 11}

In the U.S., asthma attacks are reported more frequently in children with asthma than in adults with asthma. Children younger than age 12 are more likely to have asthma attacks than those aged 12 to 17 years.

In 2016, 53.7 percent of children under 18 years with current asthma reported an asthma attack over the past year. Children 0 to 4 years of age had a higher asthma attack prevalence rate (62.4 percent) when compared with children aged 5 to 14 years (55.2 percent).

Nationally, the asthma attack prevalence rate for males with asthma was 54.6 percent and for females with asthma was 52.7 percent in 2016. Male children aged 0 to 4 years had the highest prevalence rate (66.7 percent).

Nationwide, the asthma attack prevalence rate in non-Hispanic white children (53.9 percent) was higher than the black non-Hispanic rate (53.1 percent). The prevalence rate for Hispanic children was higher at 49.0 percent. Other non-Hispanic children had the highest rate at 63.6 percent.

Introduction

Asthma in Schools ^{1, 12, 13, 14, 15}

The economic costs of childhood asthma include those related to school absences:

- Nearly one in two school aged children with asthma miss at least one day of school each year due to asthma.
- Nearly three in five children with asthma limit their usual activities because of their asthma.
- Parents of school aged children with asthma missed 1.2 times more workdays to care for their children for asthma related school absences.

Nearly 50 percent of school-aged children with asthma reported one or more asthma-related missed school days in 2013. The number of reported missed school days was 13.8 million, or approximately 2.6 days per child. The implementation of school health programs that aim to improve the health of children with asthma may assist in reducing school absences.

Asthma-friendly schools provide support and assistance to children with asthma and their families, in the form of educational programs for students, families and school staff; commitment to a safe and healthy school environment; assistance with medication; and the provision of appropriate physical education and activities for children with asthma.

The School Health Profiles (Profiles) is a set of surveys that assess school health policies and practices nationwide. Asthma management activities at the state level are among the health policies monitored and activities surveyed.

Findings from School Health Profiles for 2016 include:

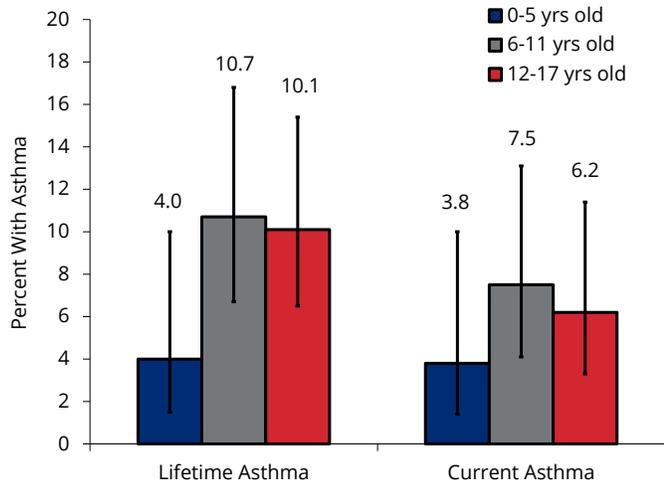
- 38.5 percent of Tennessee schools provided parents and families with health information to increase parent and family knowledge of asthma compared to the national median of 19.3 percent.
- 97.2 percent of Tennessee schools routinely use school records to identify and track students with asthma, compared to the national median of 96.9 percent.
- 48.7 percent of Tennessee schools referred students diagnosed with, or suspected of having asthma outside the school, compared with the national median of 52.7 percent.
- 58.5 percent of Tennessee schools had teachers who attempted to increase student knowledge of asthma in a required course, compared to the national median of 56.0 percent.

Prevalence

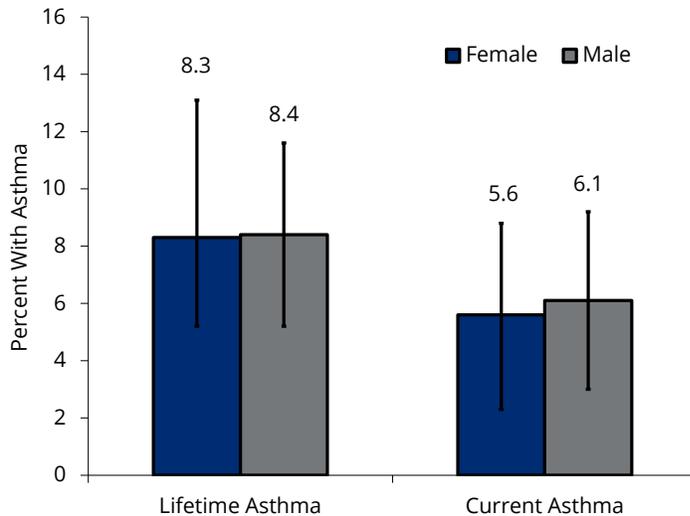
Asthma Prevalence

In 2016, lifetime childhood asthma prevalence in Tennessee was higher for children ages 6 to 11 (10.7 percent) than for other age groups. Lifetime asthma prevalence was lowest for 0 to 5 year olds (4.0 percent), followed by 12 to 17 year olds (10.1 percent).

Current asthma prevalence was lowest among 0 to 5 year olds at 3.8 percent. Current asthma prevalence was 6.2 percent among 12 to 17 year olds and 7.5 percent among 6 to 11 year olds.



Lifetime and current asthma prevalence in children, in Tennessee (NSCH 2016)



Lifetime and current asthma prevalence in children, by gender, Tennessee (NSCH 2016)

In 2016, childhood asthma prevalence in Tennessee was higher among males than among females.

Current asthma prevalence was 6.1 percent among males aged 0-17 years, compared to 5.6 percent among females.

Lifetime prevalence was 8.4 percent for males and 8.3 percent for females. These differences were not statistically significant.

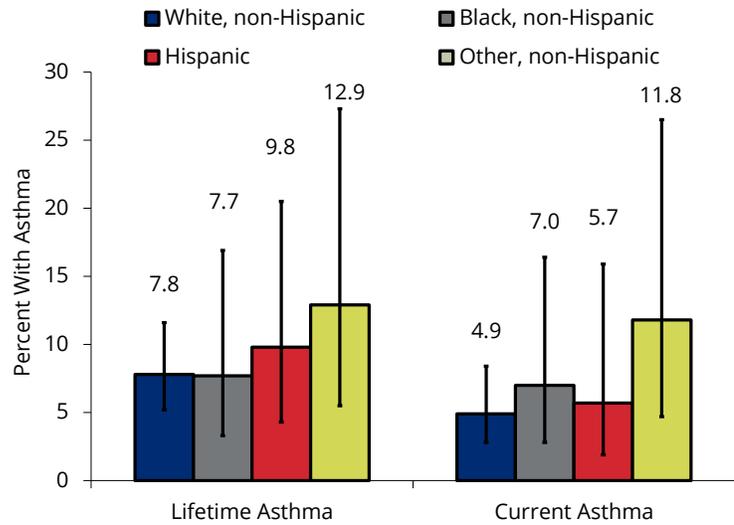
* The absence of any statement regarding the variance between rates or figures does not imply that the difference was tested and found not to be significant.

Prevalence

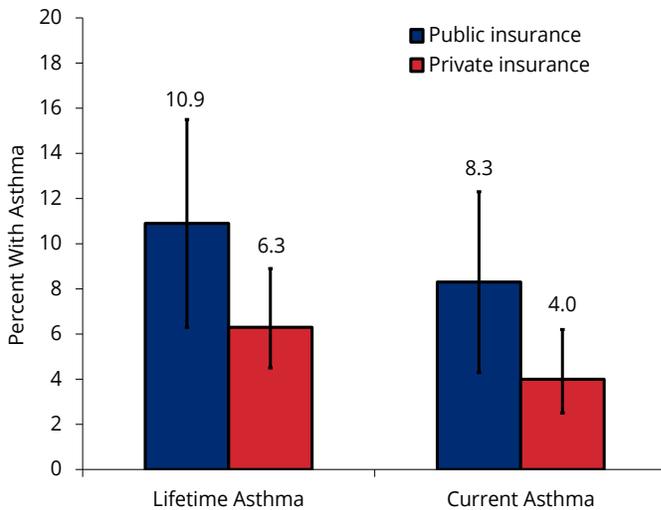
Asthma Prevalence

Childhood asthma prevalence was higher among other non-Hispanics than among white non-Hispanics or black non-Hispanics in 2016. Current asthma prevalence was 7.0 percent for black non-Hispanics compared to 4.9 percent among white non-Hispanics.

The lifetime prevalence rate for white non-Hispanics was 7.8 percent compared to 7.7 for black non-Hispanics in 2016. Other non-Hispanics had the highest lifetime prevalence rate of 12.9 percent; however, these differences by race were not statistically significant.



Lifetime and current asthma prevalence in children, by race and Hispanic ethnicity, Tennessee (NSCH 2016)



Lifetime and current asthma prevalence in children, by insurance type, Tennessee (NSCH 2016)

Lifetime childhood asthma prevalence was higher (10.9 percent) among children with public health insurance, such as TennCare, compared to 6.3 percent among children with private health insurance.

Current asthma prevalence was 8.3 percent for children with public health insurance and 4.0 percent for children with private health insurance; however, these differences by insurance type were not statistically significant.

Prevalence

Asthma and Smoking

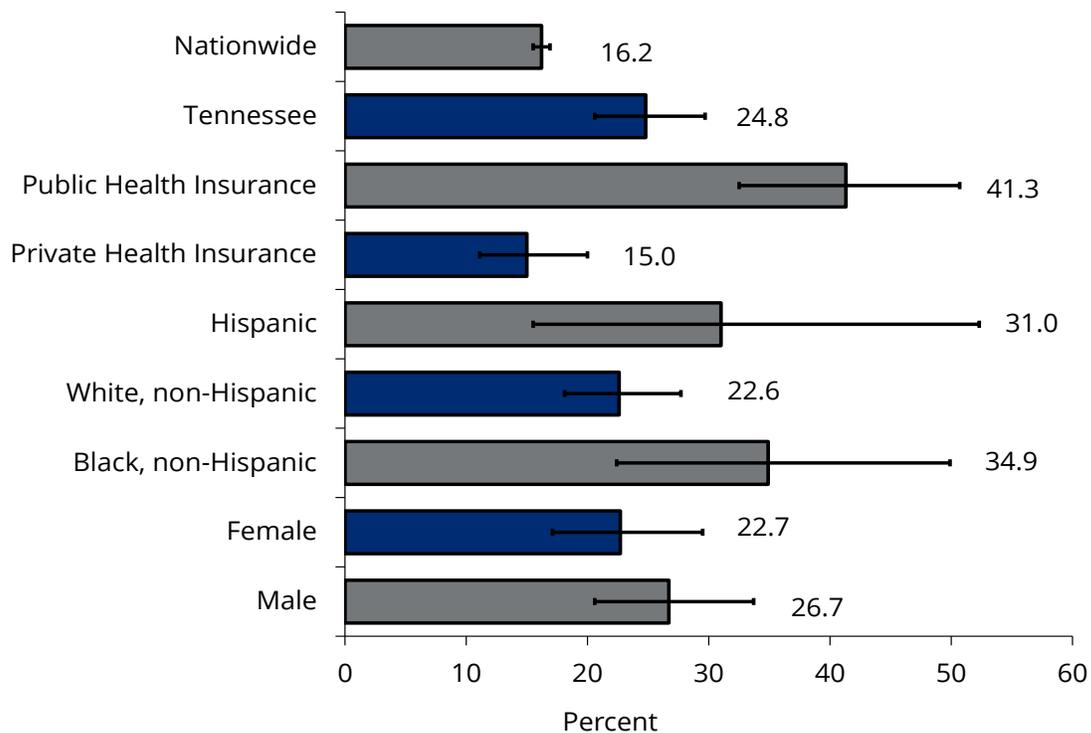
Smoking in the Household

The exposure of an infant or child to secondhand smoke has a negative impact on health and exposure to secondhand smoke can trigger an asthma attack and worsen existing asthma. Children in the household are more affected by secondhand smoke than older family members.^{16, 17}

In 2016, the percent of children living in households with tobacco use ranged from 8.6 percent in Utah to 26.5 percent in West Virginia. States with the highest “Smoking in the Household” rankings include West Virginia, Mississippi, Tennessee, Kentucky, Arkansas, Louisiana, Indiana, Missouri, Alabama and Ohio.

The percent of children living in households with tobacco use in Tennessee (24.8 percent) was 40 percent higher than the nationwide percentage (16.2 percent). Across gender, racial, and ethnic groups, there were no statistically significant differences in the percentage of children in Tennessee exposed to secondhand smoke inside their homes.

Among children in Tennessee with public health insurance, 41.3 percent were reported to live in households where someone smoked compared to 15.0 percent of children with private health insurance.



Percent of children who live in households where someone smokes, Tennessee (NSCH 2016)

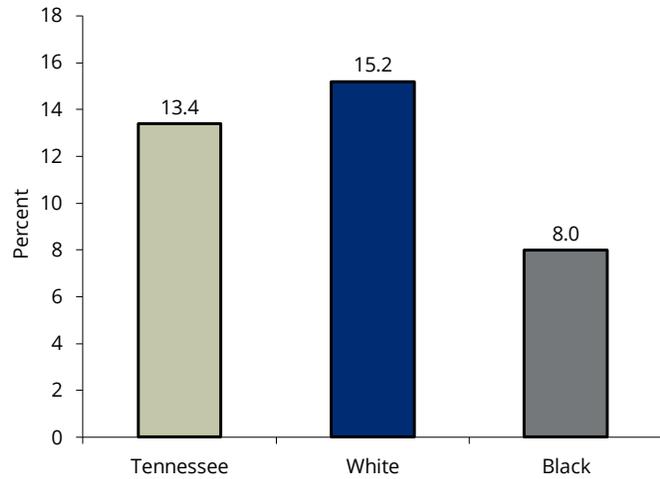
Prevalence

Asthma and Smoking

Smoking during Pregnancy

Smoking during pregnancy affects the lung development of the developing child. The development of asthma in Hispanic and black children has been associated with tobacco exposure before birth.^{17, 18, 19}

According to data from the Tennessee Birth Statistical System (BSS), in 2016, the percentage of Tennessee mothers who smoked during pregnancy was 13.4 percent. This was a 5.6 percent improvement compared to 2015 (14.2 percent). However, Tennessee was higher compared to the national percentage (7.2 percent) for 2016.²⁰

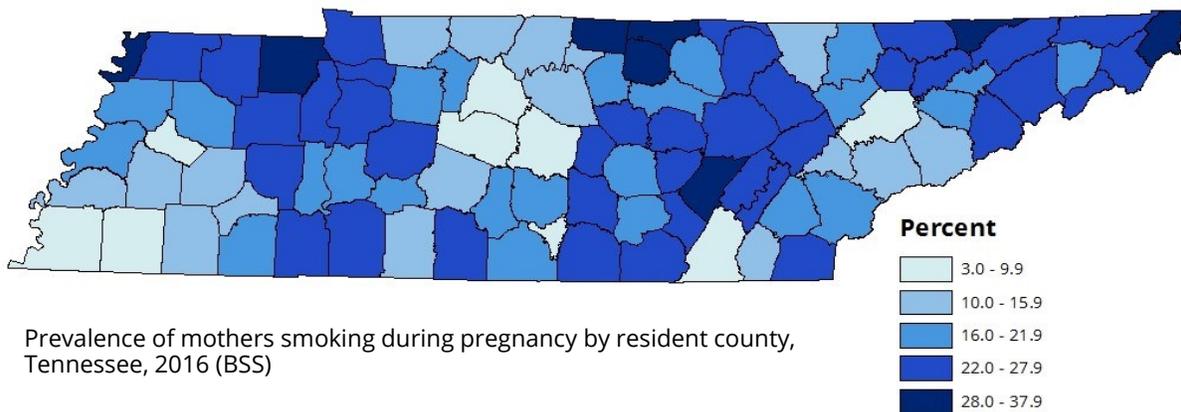


Percent of mothers smoking during pregnancy by race, Tennessee, 2016 (BSS)

The percent of white mothers (15.2 percent) who smoked during pregnancy is nearly double the percentage of black mothers who smoked during pregnancy (8.0 percent).

Tennessee counties with the highest percent of mothers who smoked during pregnancy in 2016 included Jackson (36.9 percent), Hancock (36.7 percent), Lake (34.3 percent), Clay (32.4 percent), Bledsoe (31.2 percent), Johnson (29.9 percent), Macon (29.7 percent), Henry (29.4 percent), Coffee (28.6 percent) and Hawkins (28.3 percent).

Tennessee counties with the lowest percent of mothers who smoked during pregnancy in 2016 included Williamson (3.0 percent), Shelby (5.2 percent), Davidson (6.5 percent), Fayette (7.1 percent), Rutherford (9.1 percent), Knox (9.4 percent), Hamilton (10.1 percent), Moore (10.9 percent), Crockett (11.0 percent) and Montgomery (11.6 percent).



Prevalence of mothers smoking during pregnancy by resident county, Tennessee, 2016 (BSS)

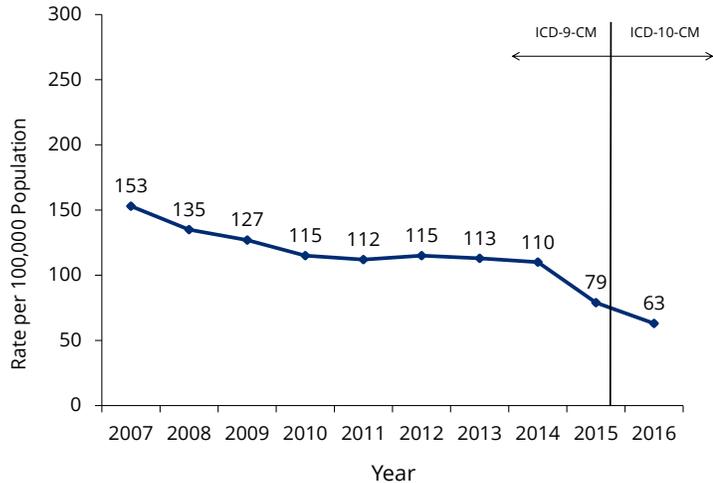
Health Care Utilization and Costs

Inpatient Hospitalizations for Asthma*

According to data from the Tennessee Hospital Discharge Data System (HDDS), in 2016 the number of inpatient hospitalizations among children in Tennessee aged 1-17 years for a primary diagnosis of asthma was 892. The rate of inpatient hospitalizations was 63 per 100,000.

From 2007 to 2016, an average of 1,569 inpatient hospitalizations were observed each year among children aged 1 to 17 with a primary diagnosis of asthma.

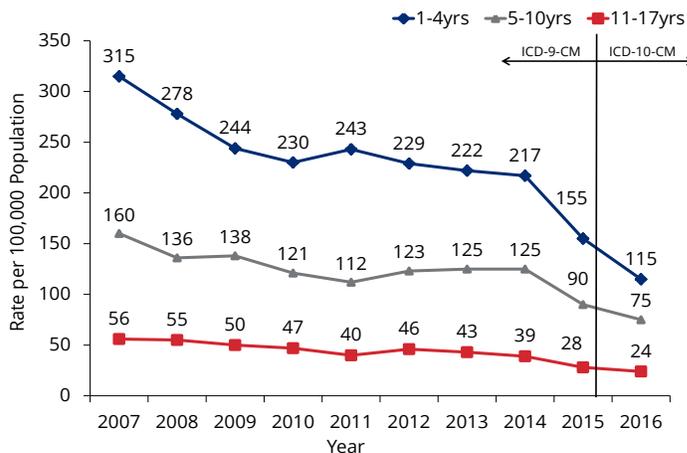
Between 2007 and 2016, the annual inpatient hospitalization rate for 1-17 year olds with a primary diagnosis of asthma decreased from 153 per 100,000 in 2007 to 63 per 100,000 in 2016.



On October, 1st 2015 there was a transition from ICD-9-CM to ICD-10-CM diagnosis coding, and differences after this change could be due to coding changes, which should be considered in interpretation of trends.

Inpatient hospitalization rate for asthma, 1-17 year olds, Tennessee, 2007-2016 (HDDS)

The annual hospitalization rate with a primary diagnosis of asthma among Tennessee children has steadily decreased from 2007 to 2016. The decrease was most prominent in children aged 1-4 years, among whom the hospitalization rate decreased from 315 per 100,000 in 2007 to 115 per 100,000 in 2016. In Tennessee children aged 5 - 10 years, the rate declined from 160 per 100,000 to 75 per 100,000, and in children aged 11-17 years, the decline was from 56 per 100,000 to 24 per 100,000.



On October, 1st 2015 there was a transition from ICD-9-CM to ICD-10-CM diagnosis coding, and differences after this change could be due to coding changes, which should be considered in interpretation of trends.

Inpatient hospitalization rate for asthma by age, Tennessee, 2007-2016 (HDDS)

*Location map of acute care hospitals by county is on page 53.

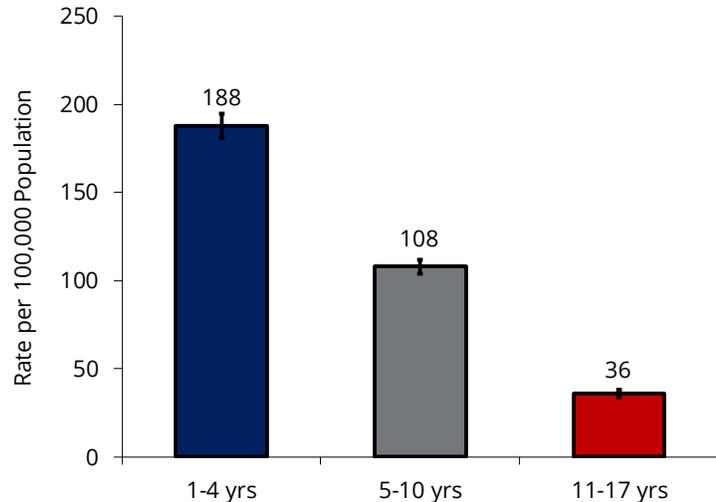
Health Care Utilization and Costs

Inpatient Hospitalizations for Asthma cont.

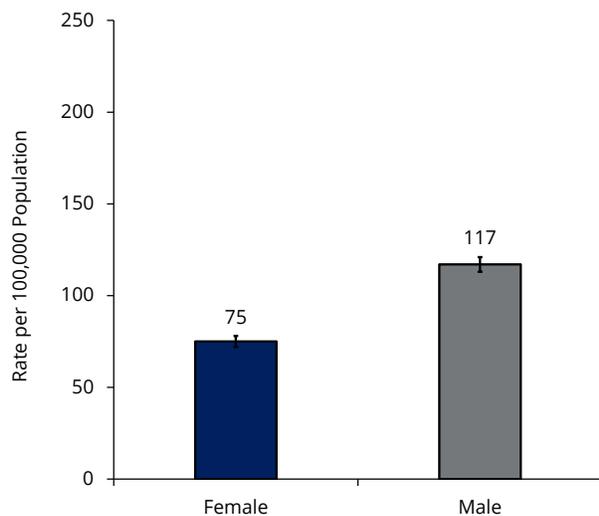
Between 2012 and 2016, the average inpatient hospitalization rate for 1-17 year olds with a primary diagnosis of asthma in Tennessee decreased as their age increased.

Children aged 1-4 years had the highest inpatient hospitalization rate for primary asthma, 188 per 100,000 population, compared to 108 per 100,000 population for 5-10 year olds and 36 per 100,000 population for 11-17 year olds.

Forty-five percent of the total hospital inpatient discharges for children with a primary diagnosis of asthma were for those aged 1-4



Inpatient hospitalization rate for asthma by age, 1-17 year olds, Tennessee, 2012-2016 average (HDDS)



Inpatient hospitalization rate for asthma by gender, 1-17 year olds, Tennessee, 2012-2016 average (HDDS)

Between 2012 and 2016, males ages 1 to 17 years had a higher inpatient hospitalization rate for asthma when compared to females.

The average inpatient hospitalization rate was 117 per 100,000 population for males, and 75 per 100,000 population for females.

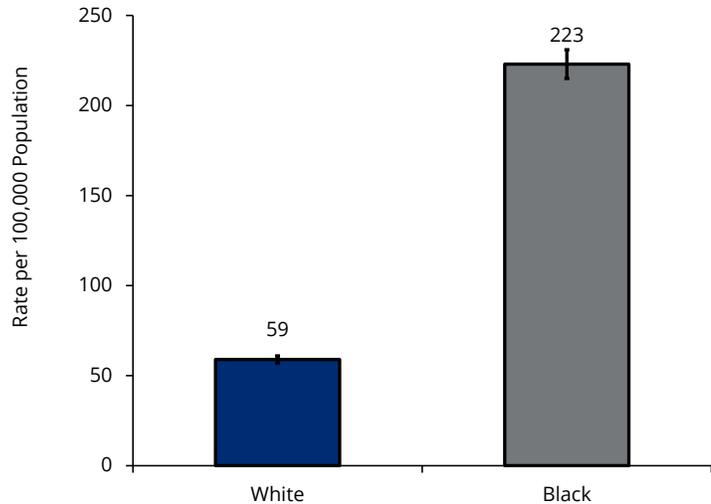
Sixty-two percent of total hospital discharges with a primary diagnosis of asthma were for males.

Health Care Utilization and Costs

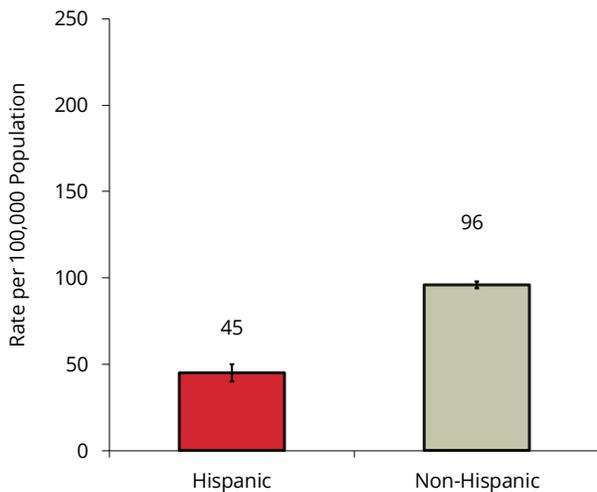
Inpatient Hospitalizations for Asthma cont.

Between 2012 and 2016, the number of inpatient hospitalizations among white and black children was 3,061 and 3,177, respectively.

Black children had a higher inpatient hospitalization rate for a primary diagnosis of asthma when compared to white children. The average annual hospitalization rate of 223 per 100,000 for black children was almost four times higher than the rate among white children of 59 per 100,000.



Inpatient hospitalization rate for asthma by race, 1-17 year olds, Tennessee, 2012-2016 average (HDDS)



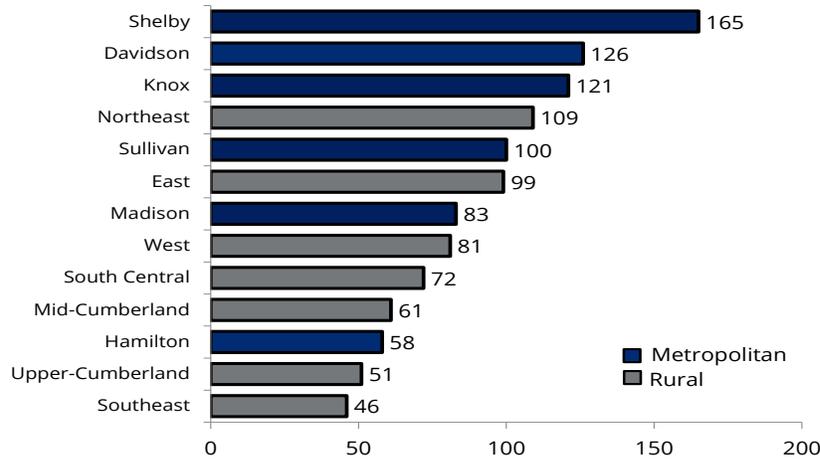
Inpatient hospitalization rate for asthma by Hispanic ethnicity, 1-17 year olds, Tennessee, 2012-2016 average (HDDS)

Hispanic children had a total of 270 inpatient hospitalizations for a primary diagnosis of asthma between 2012 and 2016. The average annual hospitalization rate was 45 per 100,000 among Hispanic children and 96 per 100,000 among non-Hispanics.

Health Care Utilization and Costs

Inpatient Hospitalizations for Asthma cont.

The average annual hospitalization rate for children with a primary diagnosis of asthma aged 1 to 17 years in Tennessee was 96 per 100,000 population between 2012 and 2016. The rate for individual Tennessee Health Department regions ranged from 46 per 100,000 in the Southeast region to 165 per 100,000 in metro Shelby County.

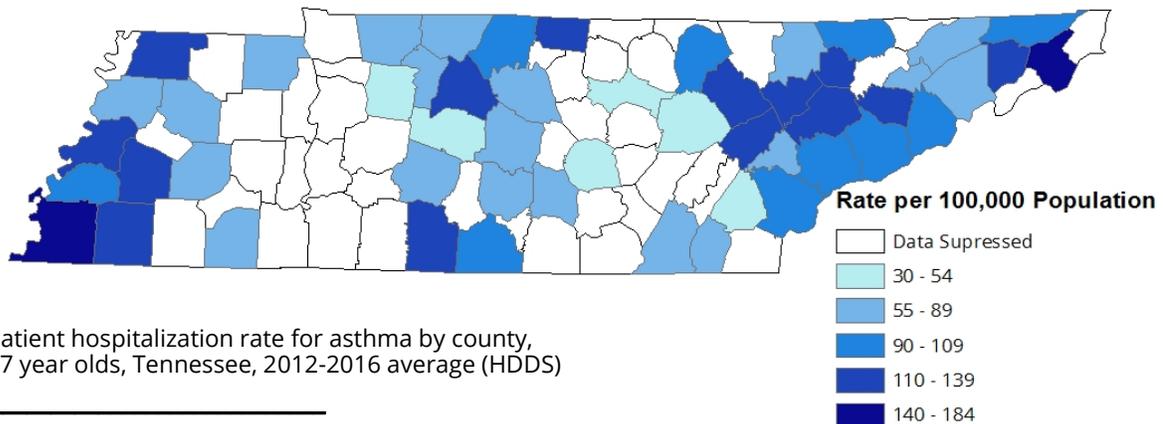


Inpatient hospitalization rate for asthma by region, 1-17 year olds, Tennessee, 2012-2016 average (HDDS)

Between 2012 and 2016, the average annual rate of inpatient hospitalizations with a primary diagnosis of asthma by Tennessee county of residence was highest in Lake County (304 per 100,000), and lowest in Bledsoe County (9 per 100,000).*

The ten counties with the highest asthma hospitalization rates for children age 1-17 years were: Lake, Carter, Shelby, Lauderdale, Haywood, Union, Roane, Davidson, Washington and Obion.

The ten counties with the lowest inpatient hospitalization rates for children age 1-17 years were: Bledsoe, Van Buren, Marion, Overton, Carroll, Lawrence, Rhea, Grundy, Williamson, Hancock and Franklin.



Inpatient hospitalization rate for asthma by county, 1-17 year olds, Tennessee, 2012-2016 average (HDDS)

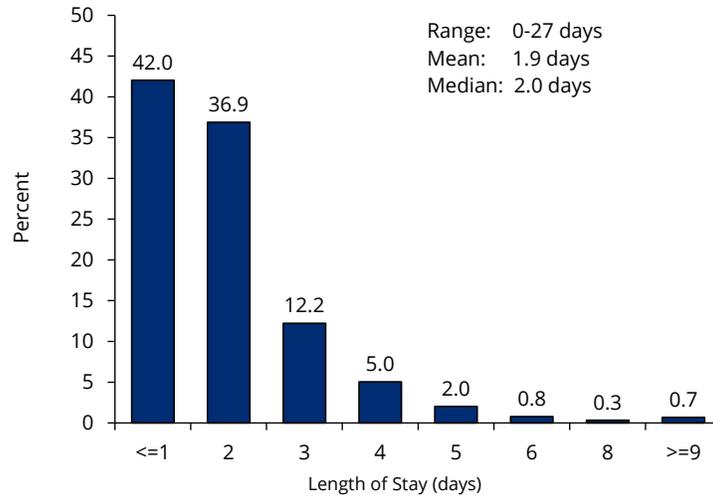
* Data are suppressed for counties with fewer than 20 inpatient hospitalizations.

Health Care Utilization and Costs

Inpatient Hospitalizations for Asthma cont.

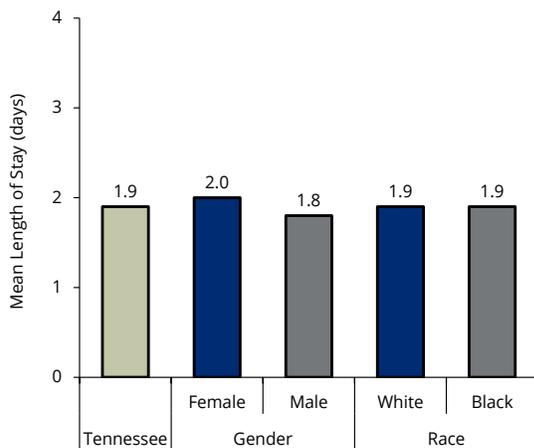
In 2016, the length of stay for inpatient hospitalizations for children aged 1 to 17 years with primary diagnosis of asthma ranged from 0 to 27 days.

The mean length of stay was 1.9 days and the median length of stay was 2.0 days.

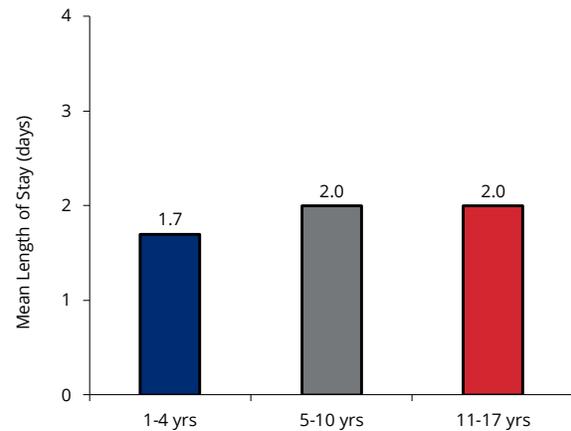


Distribution of length of stay among inpatient hospitalizations for asthma, 1-17 year olds, Tennessee, 2016 (HDDS)

In 2016, the mean length of stay for primary diagnosis of asthma was 2.0 days for females and 1.8 days for males. Black and white children had identical mean length of stay for inpatient hospitalizations (1.9 days). By age group, the average length of stay for inpatient hospitalizations was lowest for the 1-4 year old age group (1.7 days) and highest for those aged 5 to 17 years (2.0 days).



Mean length of stay among inpatient hospitalizations for asthma by gender and race, 1-17 year olds, Tennessee, 2016 (HDDS)



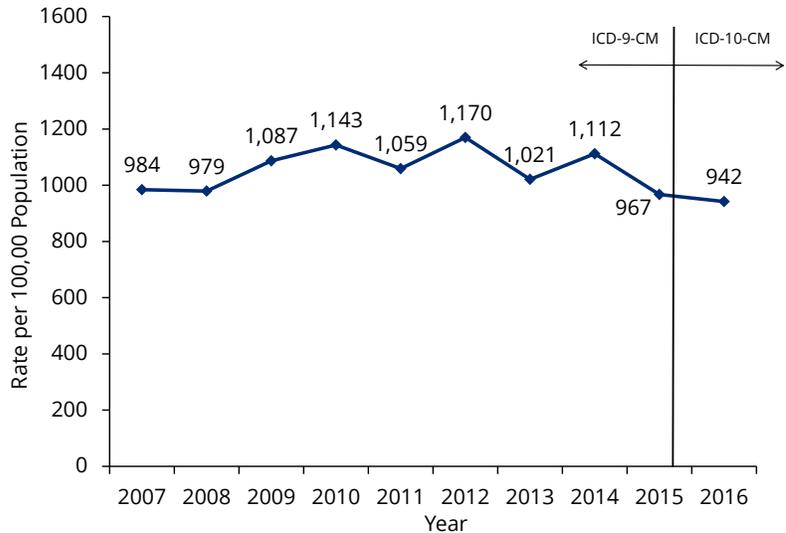
Mean length of stay among inpatient hospitalizations for asthma by age, 1-17 year olds, Tennessee, 2016 (HDDS)

Health Care Utilization and Costs

Emergency Department Visits for Asthma*

In 2016, there were 13,312 emergency department (ED) visits among Tennessee children aged 1-17 years with a primary diagnosis of asthma. The emergency department visit rate for children with a primary diagnosis of asthma was 942 per 100,000 children.

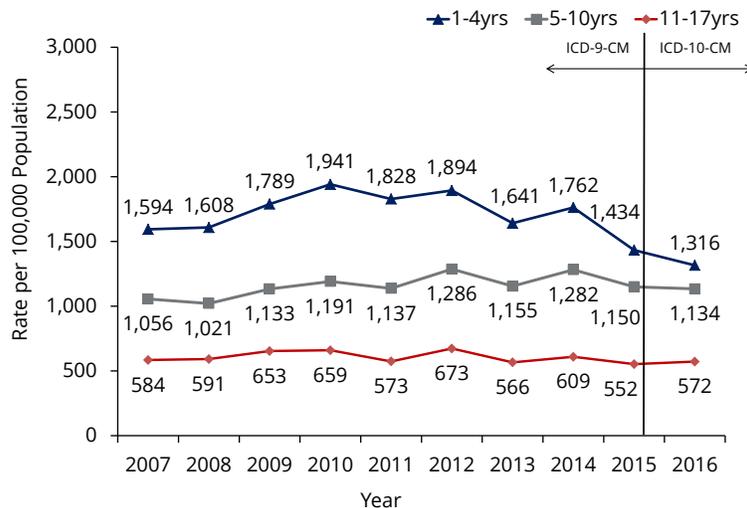
The annual average emergency department visit rate for children with a primary diagnosis of asthma was 1,047 per 100,000 visits.



On October, 1st 2015 there was a transition from ICD-9 -CM to ICD-10-CM diagnosis coding, and differences after this change could be due to coding changes, which should be considered in interpretation of trends.

Emergency Department visit rate for asthma, 1-17 year olds, Tennessee, 2007-2016 (HDDS)

The annual emergency department visit rate for children with a primary diagnosis of asthma averaged 1,681 per 100,000 for the 1-4 year old age group, 1,155 per 100,000 for the 5-10 year old age group and 603 per 100,000 for the 11-17 year old age group.



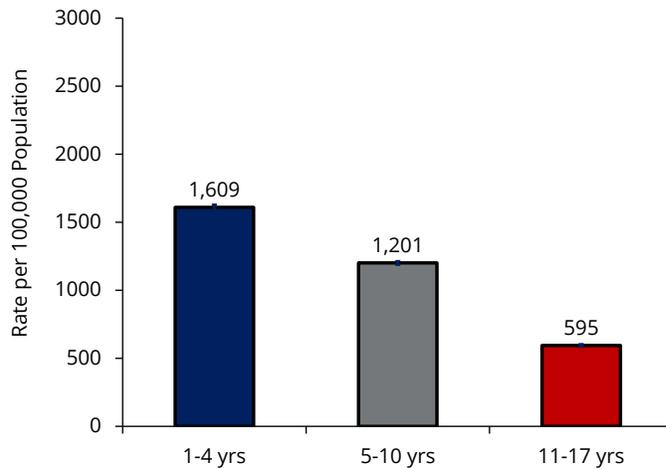
On October, 1st 2015 there was a transition from ICD-9 -CM to ICD-10-CM diagnosis coding, and differences after this change could be due to coding changes, which should be considered in interpretation of trends.

Emergency Department visit rate for asthma by age, 1-17 year olds, Tennessee, 2007-2016 (HDDS)

*Location map of acute care hospitals by county is on page 53.

Health Care Utilization and Costs

Emergency Department Visits for Asthma cont.



Emergency Department visit rate for asthma by age, 1-17 year olds, Tennessee, 2012-2016 average (HDDS)

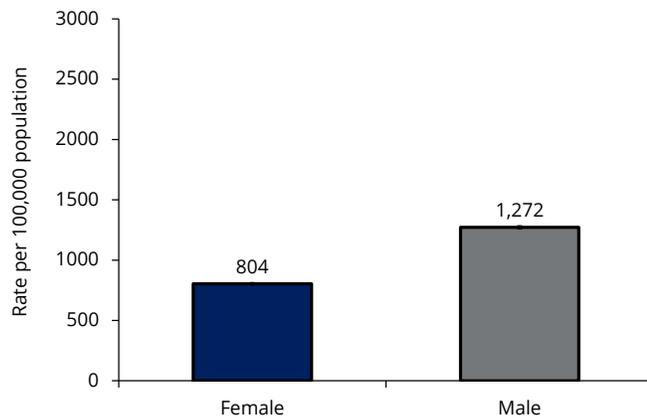
Between 2012 and 2016, the average rate of emergency department visit for a primary diagnosis of asthma differed by age group.

The rate of emergency department visits for asthma for patients aged 1-4 years was the highest among all age groups at 1,609 per 100,000. Thirty-five percent of the total emergency department visits for children were for those aged 1-4 years.

This was followed by the rate of emergency department visit for asthma among children aged 5-10 years at 1,201 per 100,000, followed by a rate of 595 per 100,000 for those aged 11-17 years.

Between 2012 and 2016, males represented sixty-two percent of the total emergency department visits for a primary diagnosis of asthma by children, and had a higher emergency department visit rate than females.

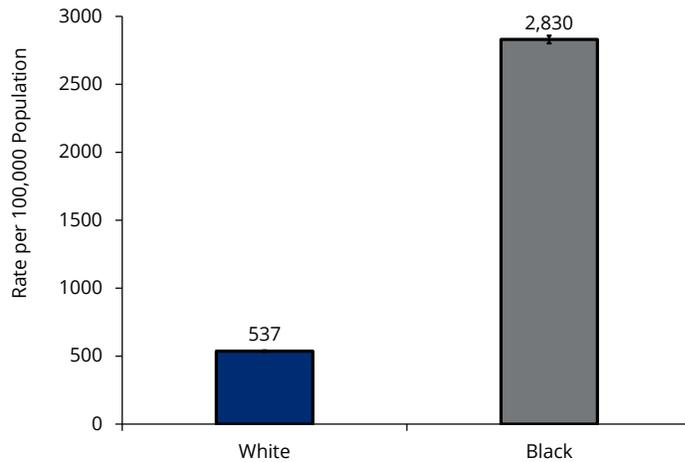
Between 2012 and 2016, the average rate of emergency department visit was 1,271 per 100,00 for males and 804 per 100,000 for females.



Emergency Department visit rate for asthma by gender, 1-17 year olds, Tennessee, 2012-2016 average (HDDS)

Health Care Utilization and Costs

Emergency Department Visits for Asthma cont.



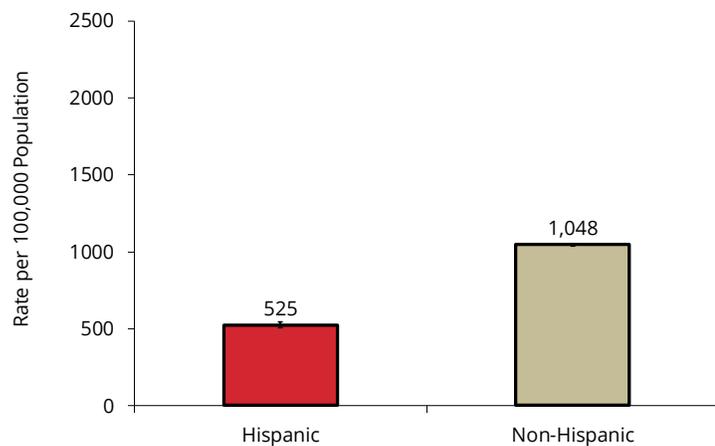
Emergency Department visit rate for asthma by race, 1-17 year olds, Tennessee, 2012-2016 average (HDDS)

Between 2012 and 2016, there were 27,876 emergency department visits for asthma among white children and 40,326 among black children.

Between 2012 and 2016, the average emergency department visit rate among black children was more than five times higher than the rate among white children. The average emergency department visit rate for asthma was 2,830 per 100,000 among black children and 537 per 100,000 among white children.

Between 2012 and 2016, there were 3,161 emergency department visits among Hispanic children with a primary diagnosis of asthma .

The average rate of emergency department visits was 525 per 100,000 among Hispanics and 1,048 per 100,000 among non-Hispanics.

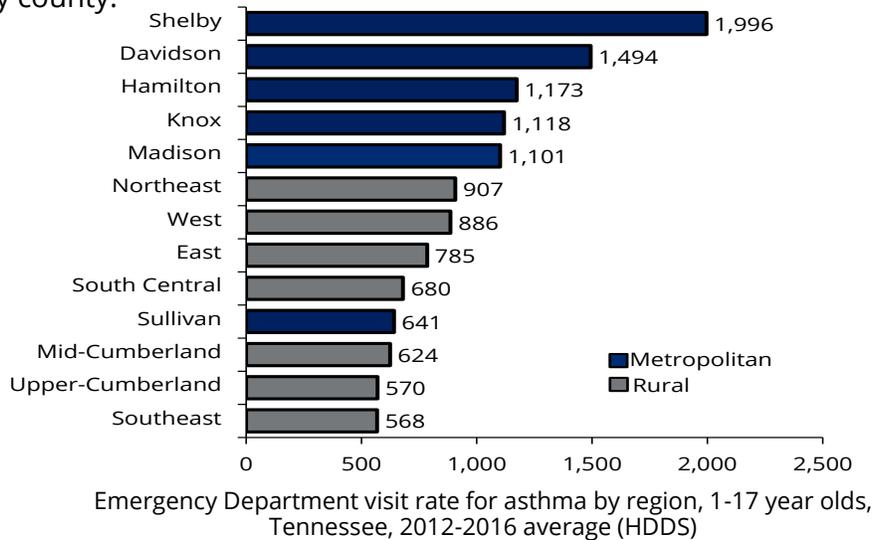


Emergency Department visit rate for asthma by Hispanic ethnicity, 1-17 year olds, Tennessee, 2012-2016 average (HDDS)

Health Care Utilization and Costs

Emergency Department Visits for Asthma cont.

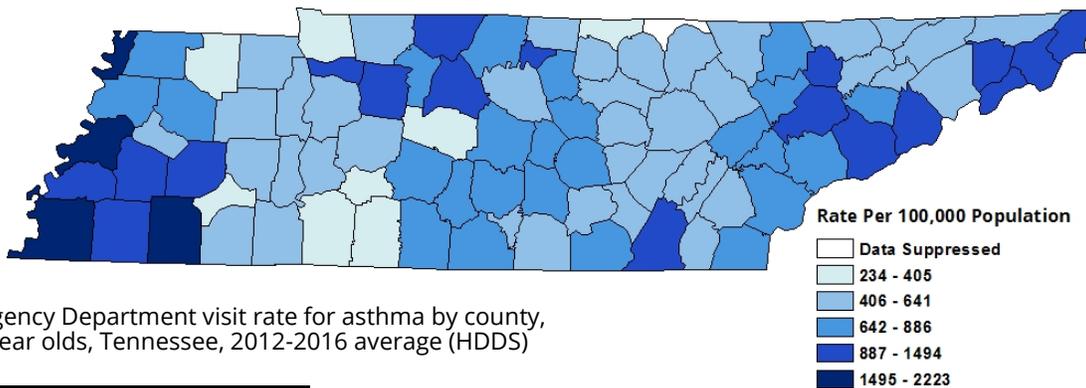
The average annual rate of emergency department visits for a primary diagnosis of asthma among children aged 1 to 17 years in Tennessee was 1,042 per 100,000 population between 2012 and 2016. The rate for individual Tennessee Health Department regions ranged from 568 per 100,000 in the Southeast region to 1,996 per 100,000 in metro Shelby county.



Between 2012 and 2016, the average annual rate of emergency department visits for asthma by Tennessee county of residence was highest in Hardeman County (2,223 per 100,000) and lowest in Lewis County (234 per 100,000).*

The ten counties with the highest rates for emergency department visits for asthma among children were: Hardeman, Lake, Shelby, Lauderdale, Davidson, Hamilton, Cocke, Washington, Fayette and Knox.

The ten counties with the lowest rate of emergency department visits for asthma among children were: Lewis, Pickett, Stewart, Lawrence, Clay, Williamson, Weakley, Chester, Wayne and Sequatchie.



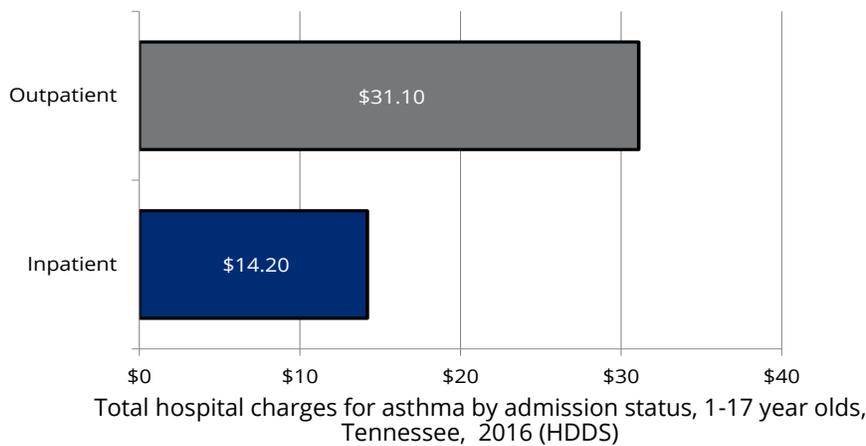
* Data are suppressed for counties with fewer than 20 emergency department visits

Health Care Utilization and Costs

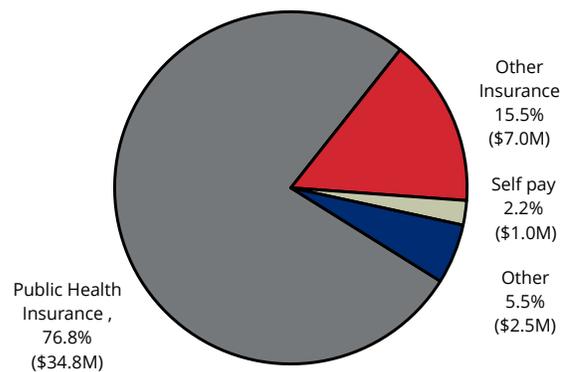
Hospital Charges for Asthma*

In 2016, total hospital charges for a primary asthma diagnosis among children aged 1 to 17 years in Tennessee were \$45.3 million. This included charges for both inpatient and hospital-based outpatient visits.**

Approximately 31.3 percent of asthma charges for children (\$14.2 million) were for inpatient hospitalizations and 68.7 percent (\$31.1 million) were for outpatient visits. Although inpatient hospitalizations represented only 7.0 percent of all asthma hospital visits among children, they accounted for 31.3 percent of total hospital charges for asthma.



In 2016, children with public health insurance contributed to 76.8 percent of asthma charges for children, totaling \$34.8 million. Children with other health insurance contributed 15.5 percent (\$7.0 million), followed by self-pay with 2.2 percent (\$1.0 million) and other or unknown payer with 5.5 percent (\$2.5 million).



Total hospital charges for asthma by payer, 1-17 year olds, Tennessee, 2016 (HDDS)

* Charges prior to 2016 have been adjusted to 2016 dollars.

** Inpatient hospitalizations refer to patients who were admitted to the hospital for treatment.

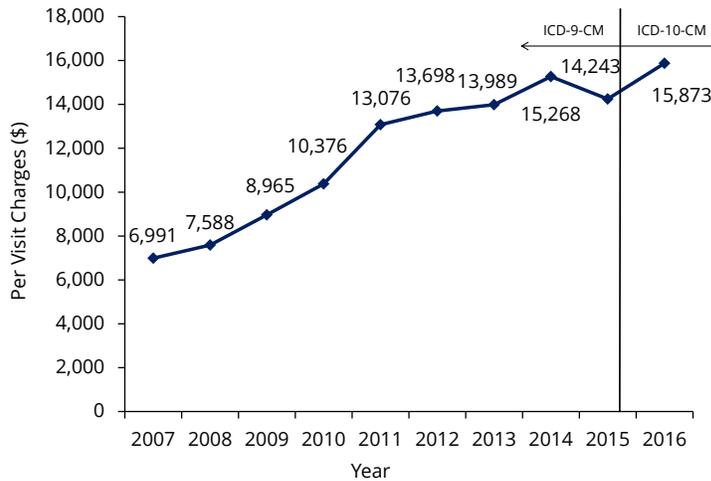
Outpatient visits refer to patients who were treated in a hospital outpatient facility without subsequent admission.

Health Care Utilization and Costs

Hospital Charges for Asthma cont.

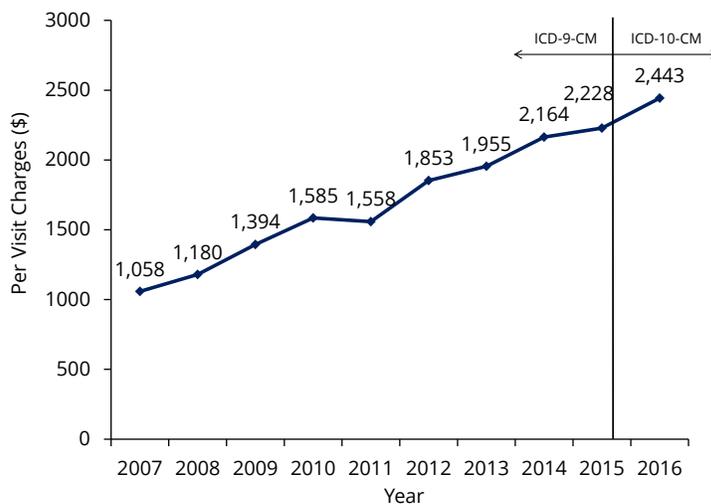
In 2016, the average per visit charge for inpatient hospitalization for children for asthma was \$15,873, and the average per visit charge for outpatient visit was \$2,443.

Annual per visit charge for asthma more than doubled from 2007 to 2016. There has been a steady increase in the annual per visit charges. The per visit charge for inpatient hospitalization for children averaged \$12,007, and the per visit charge for outpatient visits for children averaged \$1,742 over the same time period.



On October, 1st 2015 there was a transition from ICD-9 -CM to ICD-10-CM diagnosis coding, and differences after this change could be due to coding changes, which should be considered in interpretation of trends.

Inflation-adjusted per visit charges for inpatient hospitalizations for asthma, 1-17 year olds, Tennessee, 2007-2016 (HDDS)



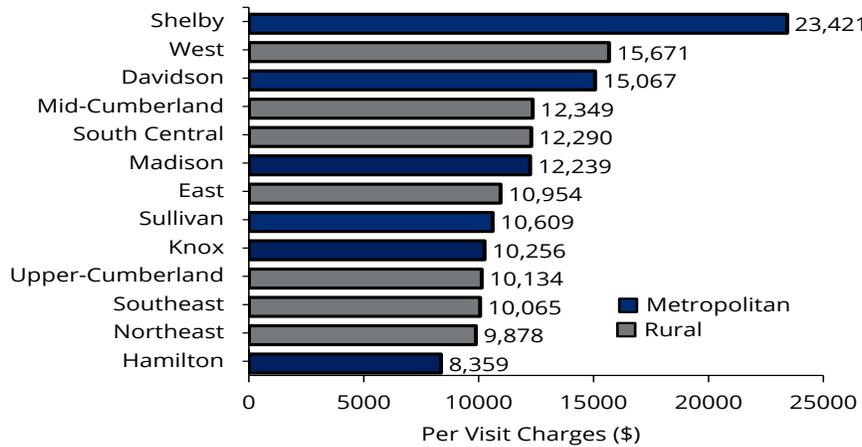
On October, 1st 2015 there was a transition from ICD-9 -CM to ICD-10-CM diagnosis coding, and differences after this change could be due to coding changes, which should be considered in interpretation of trends.

Inflation-adjusted per visit charges for outpatient visits for asthma, 1-17 year olds, Tennessee, 2007-2016 (HDDS)

Health Care Utilization and Costs

Hospital Charges for Asthma cont.

Between 2012 and 2016, the average per visit charge for inpatient hospitalizations for children aged 1 to 17 years in Tennessee was \$14,614 . The average per visit charge for children by individual Tennessee Health Department regions ranged from \$8,359 in metro Hamilton County to \$23,421 in metro Shelby County.

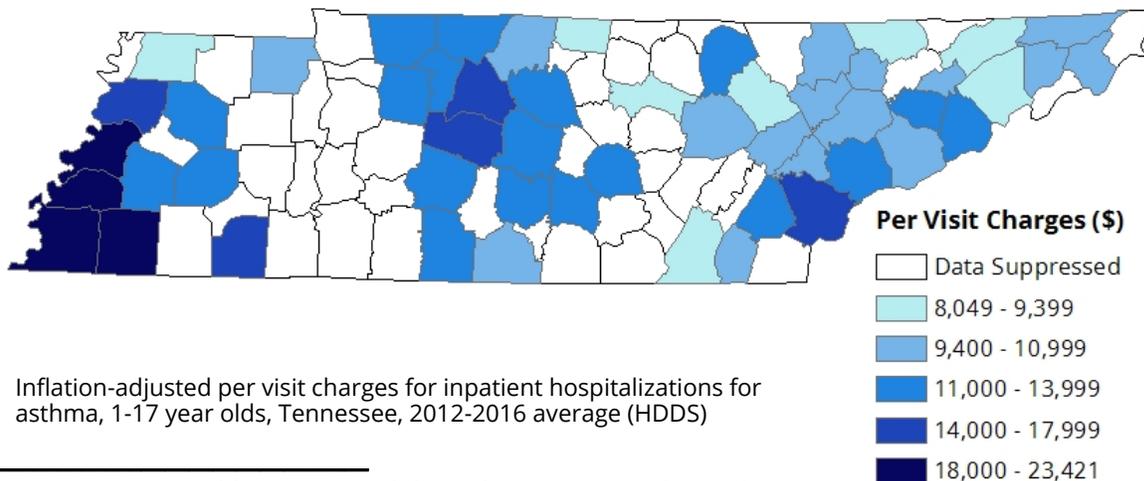


Inflation-adjusted per visit charges for inpatient hospitalizations for asthma by region, 1-17 year olds, Tennessee, 2012-2016 (HDDS)

Between 2012 and 2016, the average per visit charge for inpatient hospitalization for asthma in children by Tennessee county of residence was highest in Hancock County (\$42,064) and lowest in Grundy County (\$4,134).*

The ten counties with the highest per visit charge for asthma among children were: Hancock, Hickman, Crockett, Lake, Shelby, Fayette, Lauderdale, Tipton, Cannon and Marshall.

The ten counties with the lowest per visit charges for asthma among children were: Grundy, Bledsoe, Clay, Decatur, Benton, Jackson, Franklin, Henderson, Hawkins and Putnam.



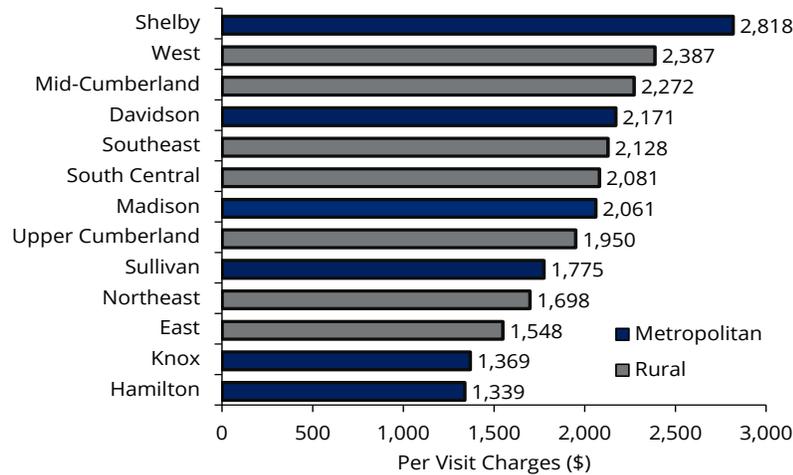
Inflation-adjusted per visit charges for inpatient hospitalizations for asthma, 1-17 year olds, Tennessee, 2012-2016 average (HDDS)

* Data are suppressed for counties with fewer than 20 inpatient hospitalizations

Health Care Utilization and Costs

Hospital Charges for Asthma cont.

The average per visit charge for outpatient visits for asthma among children aged 1 to 17 years in Tennessee was \$2,129 between 2012 and 2016. The average per visit charge for individual Tennessee Health Department regions ranged from \$1,339 in metro Hamilton County to \$2,818 in metro Shelby County.

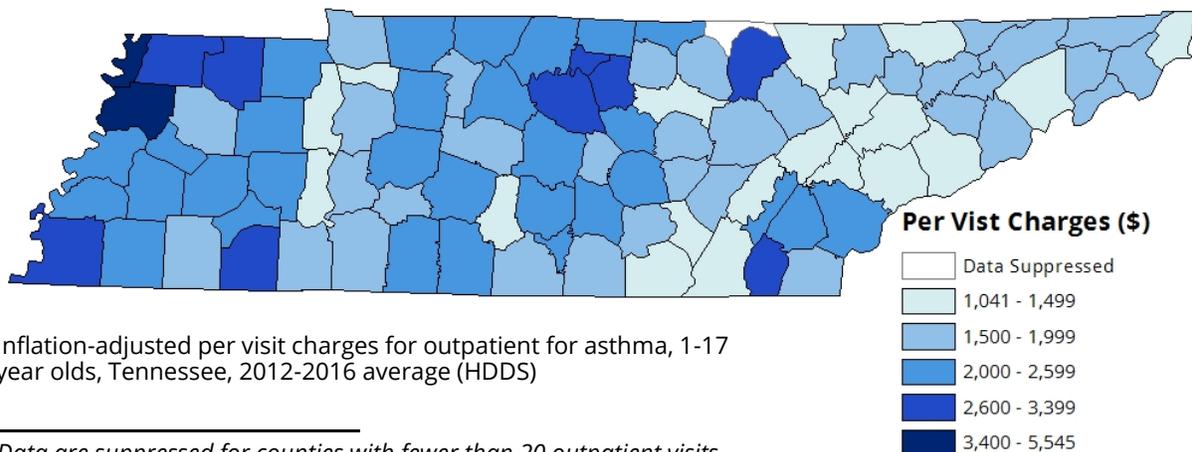


Inflation-adjusted per visit charges for outpatient visits for asthma by region, 1-17 year olds, Tennessee, 2012-2016 (HDDS)

Between 2012 and 2016, the average per visit charge for outpatient visits for asthma in children, by Tennessee county of residence, was highest in Lake county (\$5,019) and lowest in Decatur county (\$756).*

The ten counties with the highest per visit charge for asthma among children were: Lake, Dyer, Weakley, McNairy, Bradley, Wilson, Obion, Clay, Trousdale, and Shelby.

The ten counties with the lowest per visit charge for asthma among children were: Decatur, Marshall, Rhea, Houston, Johnson, Sevier, Claiborne, Roane, Perry, and Loudon.



Inflation-adjusted per visit charges for outpatient for asthma, 1-17 year olds, Tennessee, 2012-2016 average (HDDS)

* Data are suppressed for counties with fewer than 20 outpatient visits

Asthma Among TennCare Enrollees

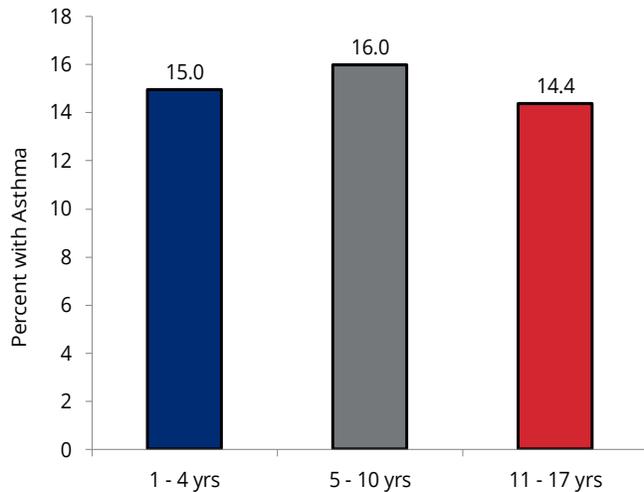
Asthma Prevalence

TennCare is Tennessee's Medicaid program which provides health coverage to vulnerable populations, including low-income children, pregnant women and the disabled. In 2016, there were 834,317 children aged 0-17 years enrolled in TennCare, representing approximately 55.8 percent of children in the state.

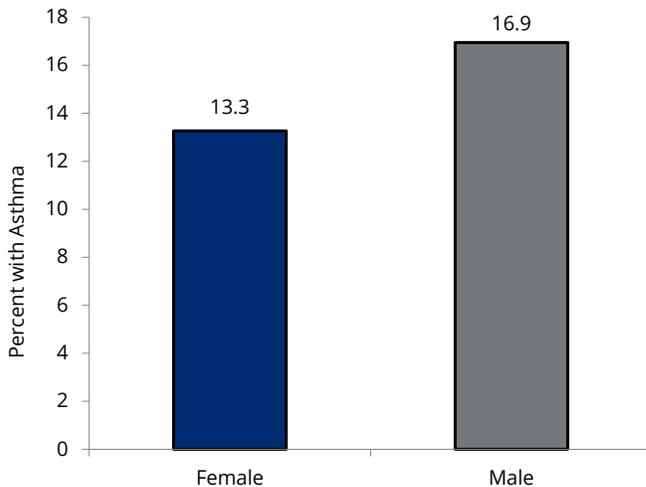
The 3-year prevalence of asthma among children enrolled in TennCare was 15.1 percent between 2014 and 2016. Asthma prevalence was 15.0 percent among 1-4 year olds, 16.0 percent among 5-10 year olds, and 14.4 percent among 11-17 year olds enrolled in TennCare.

In 11-17 years olds, asthma prevalence increased by 25.2 percent from 2010-2012 (11.5 percent) to 2014-2016. The asthma prevalence rate for the 5-10 year old age group increased by 15.9 percent over the same time period. (13.8 percent in 2010-2012)

In 2014-2016, asthma prevalence decreased by 7 percent among 1 - 4 year olds compared to 2010-2012 (16.2 percent).



Asthma prevalence by age, 1-17 year olds, TennCare enrollees, 2014 - 2016 (TennCare)



Asthma prevalence by gender, 1-17 year olds, TennCare enrollees, 2014 - 2016 (TennCare)

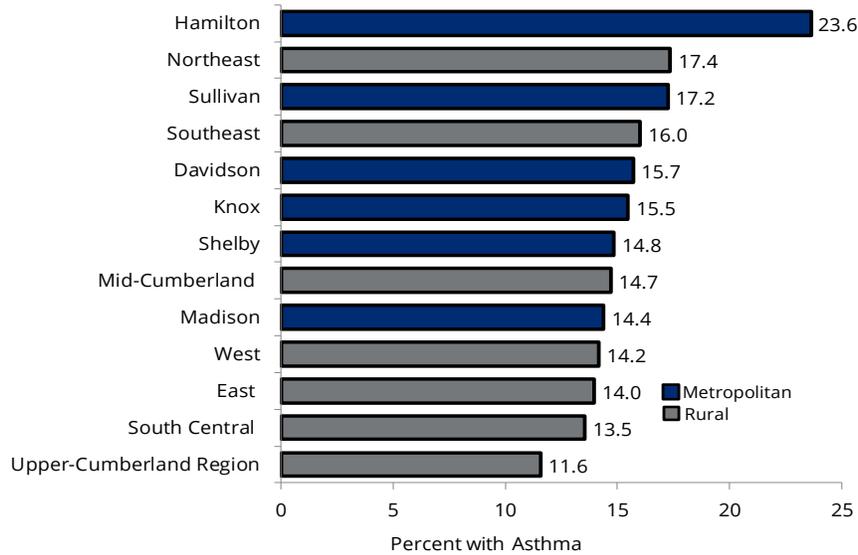
Between 2014 and 2016, asthma prevalence was higher among males than among females (16.9 percent vs. 13.3 percent, respectively).

In 2010-2012, asthma prevalence was 15.5 percent among males and 11.9 percent among females. In 2014-2016 asthma prevalence had increased by 9.0 percent among males and 11.8 percent among females.

Asthma Among TennCare Enrollees

Asthma Prevalence

In 2014-2016, the asthma prevalence rate for individual Tennessee Health Department regions ranged from 11.6 percent in Upper-Cumberland region to 23.6 percent in metro Hamilton County.

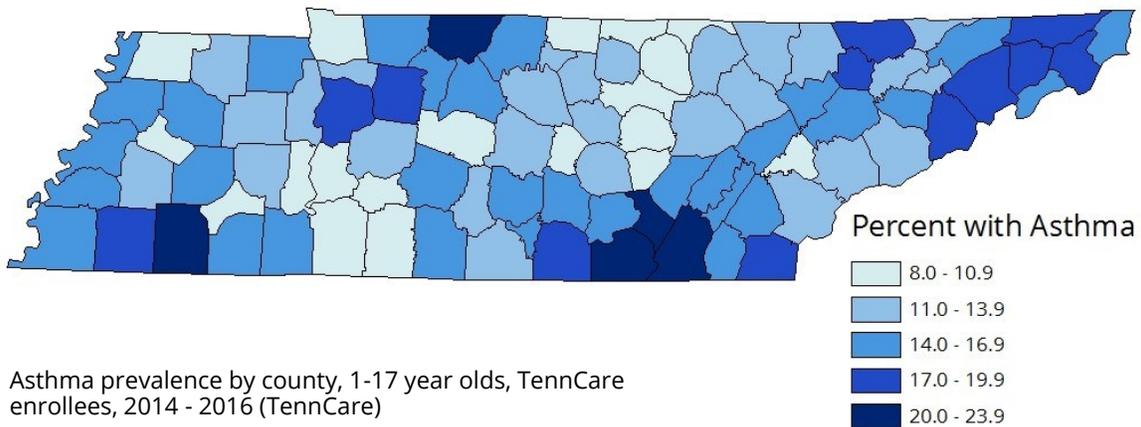


Asthma prevalence by region, 1-17 year olds, TennCare enrollees, 2014-2016 (TennCare)

In Tennessee, asthma prevalence among children enrolled in TennCare was highest in Hamilton County (23.6 percent) and lowest in Clay County (8.2 percent).

The ten counties with the highest asthma prevalence in children enrolled in TennCare were: Hamilton, Hardeman, Robertson, Sequatchie, Marion, Cocke, Greene, Washington, Carter and Humphreys.

The ten counties with the lowest asthma prevalence in children enrolled in TennCare were: Clay, Van Buren, Perry, White, Crockett, Lewis, Wayne, Overton, Obion and Stewart.



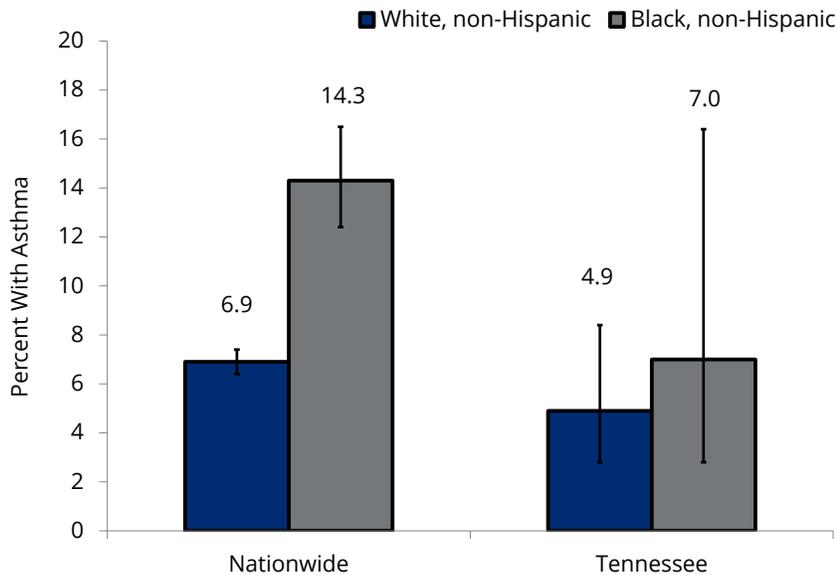
Asthma prevalence by county, 1-17 year olds, TennCare enrollees, 2014 - 2016 (TennCare)

Racial and Ethnic Health Disparities

Differences in Prevalence

Racial and ethnic minority populations are disproportionately affected by asthma in the U.S. Despite an overall national decline in the prevalence of asthma in U.S. children since 2010, childhood asthma is most prevalent in black non-Hispanic children.^{21, 22}

In 2016, current asthma prevalence in the U.S. was 14.3 percent for black non-Hispanic children compared to 6.9 percent among white non-Hispanics. In Tennessee, black non-Hispanic children had higher asthma prevalence rates than their white counterparts. The current asthma prevalence rates were not statistically significant. (NSCH)

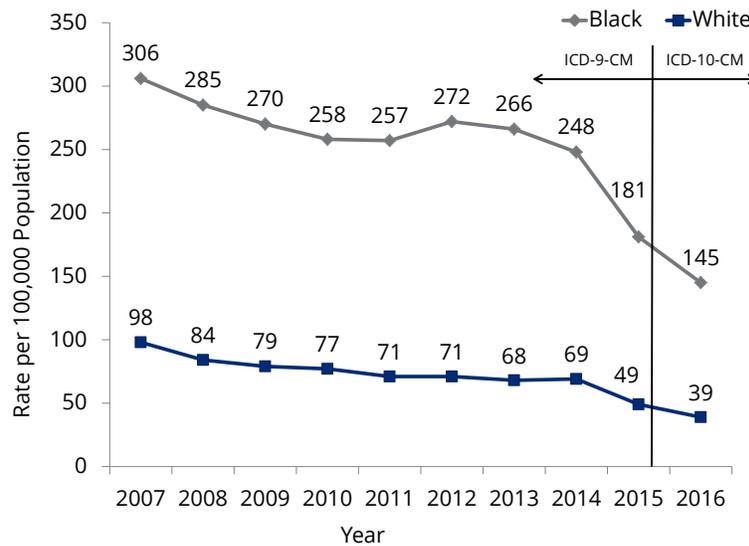


Current asthma prevalence in children by race, Tennessee and the United States (NSCH 2016)

Racial and Ethnic Health Disparities

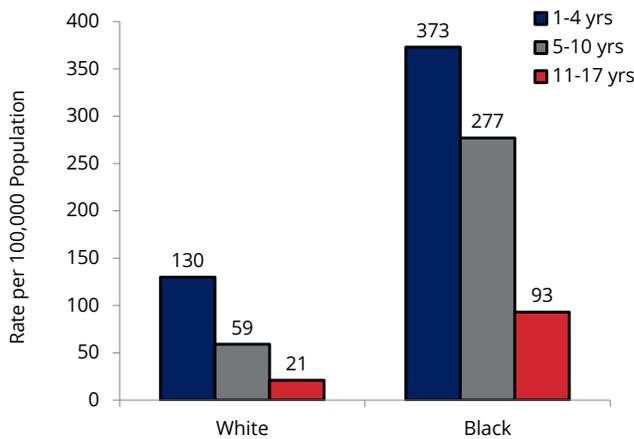
Differences in Inpatient Hospitalizations

From 2007 to 2016, there was an overall decline in the inpatient hospitalization rate for both black and white children. In 2016, the rate of inpatient hospitalizations to asthma among black children in Tennessee aged 1- 17 was 145 per 100,000, which stands in contrast to the rate for white children, which was 39 per 100,000. The rate of hospitalization due to asthma was nearly four times higher for black children compared to white children.



On October, 1st 2015 there was a transition from ICD-9 -CM to ICD-10-CM diagnosis coding, and differences after this change could be due to coding changes, which should be considered in interpretation of trends.

Trend in inpatient hospitalization rate for primary asthma by race, Tennessee, 2007-2016 (HDDS)



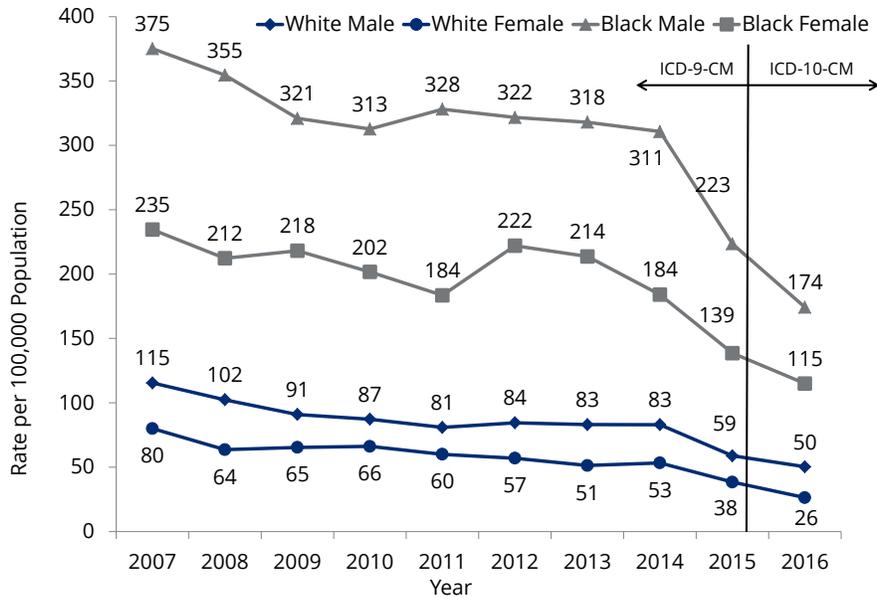
Inpatient hospitalization rate for primary asthma by race and age group, 1-17 year olds, Tennessee, 2012-2016 average (HDDS)

Among all age groups, black children had the highest five-year average (2012-2016) inpatient hospitalization rate for primary asthma compared to white children. The inpatient hospitalization rate for black children aged 1-4 years was three times higher than that of their white counterparts (373 vs. 130 per 100,000, respectively). Black and white children aged 5-10 years and 11-17 years exhibited similar disparities in inpatient hospitalization rates.

Racial and Ethnic Health Disparities

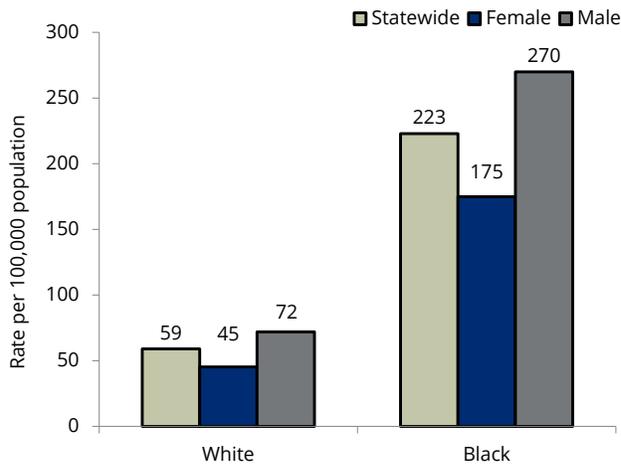
Differences in Inpatient Hospitalizations

In 2016, black males had the highest rate of inpatient hospitalizations for primary asthma (174 per 100,000 children), followed by black females (115 per 100,000), white males (50 per 100,000) and white females (26 per 100,000). From 2007 to 2016, there was a decline in the total inpatient hospitalization rate for both gender groups, across both races.



On October, 1st 2015 there was a transition from ICD-9 -CM to ICD-10-CM diagnosis coding, and differences after this change could be due to coding changes, which should be considered in interpretation of trends.

Trend in inpatient hospitalization rate for primary asthma by race and gender, Tennessee, 2007-2016 (HDDS)



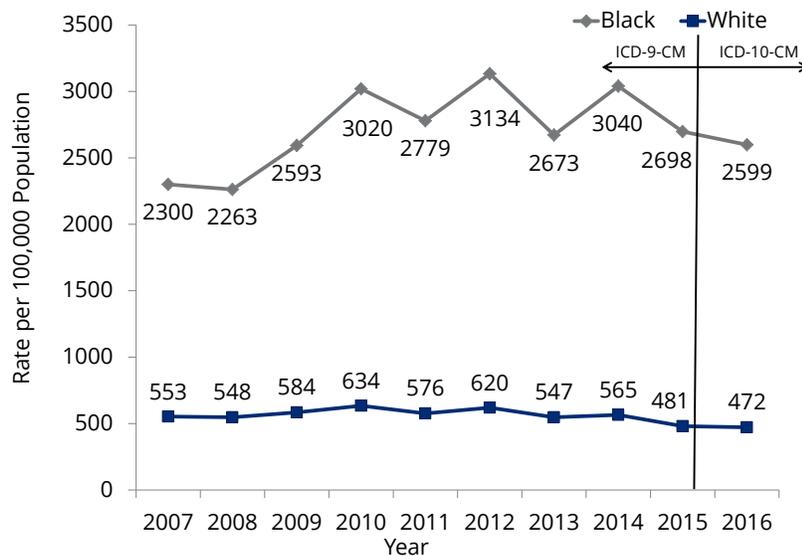
Between 2012 and 2016, black male children had three times the rate of inpatient hospitalization for primary asthma compared to white male children (270 vs. 72 per 100,000, respectively), and black female children had four times the rate of white female children (175 vs. 45 per 100,000, respectively).

Inpatient hospitalization rate for primary asthma by race and gender, 1-17 year olds, Tennessee, 2012-2016 (HDDS)

Racial and Ethnic Health Disparities

Differences in Emergency Department Visits

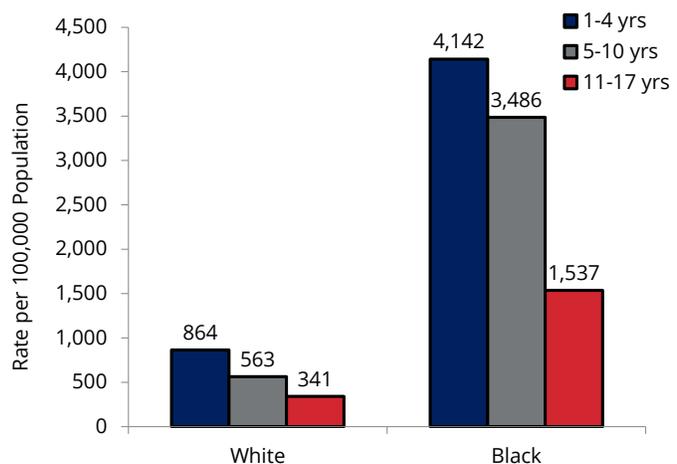
In 2016, the rate of emergency department visits in Tennessee for black children (2,599 per 100,000) was five and a half times the rate for white children (472 per 100,000). From 2007 to 2016, the overall disparities in emergency department visit rates between black children and white children increased.



On October, 1st 2015 there was a transition from ICD-9-CM to ICD-10-CM diagnosis coding, and differences after this change could be due to coding changes, which should be considered in interpretation of trends.

Trend in emergency department visit rate for primary asthma by race, 1-17 year olds, Tennessee, 2007-2016 (HDDS)

The five-year average (2012-2016) emergency department visit rate for asthma was four and a half times greater in black children ages 1-4 years (4,142 per 100,000), compared to their white counterparts (864 per 100,000). Rates for black children ages 5-10 years and 11-17 years exhibited similar disparities when compared to white children in the same age ranges.

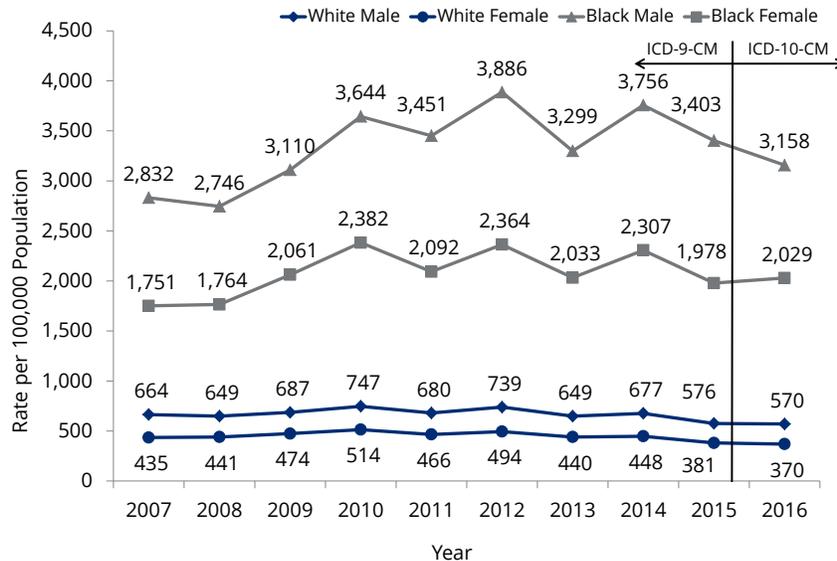


Emergency Department visit rate for asthma by race and age group, 1-17 year olds, Tennessee, 2012-2016 average (HDDS)

Racial and Ethnic Health Disparities

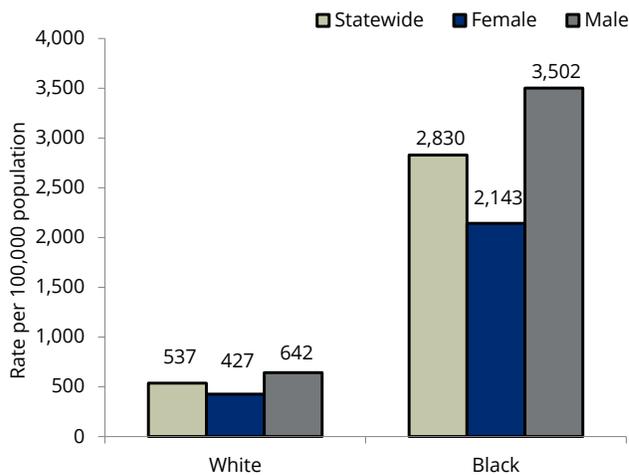
Differences in Emergency Department Visits

From 2007 to 2016, there was an increase in the total emergency department visit rate for black children. In 2016, the rate of emergency department visits due to asthma in children was five and a half times greater in black males (3,158 per 100,000) compared to white males (570 per 100,000), and five and a half times greater in black females (2,029 per 100,000) compared to white females (370 per 100,000).



On October, 1st 2015 there was a transition from ICD-9 -CM to ICD-10-CM diagnosis coding, and differences after this change could be due to coding changes, which should be considered in interpretation of trends.

Trend in emergency department visit rate for asthma by race and gender, 1-17 year olds, Tennessee, 2007-2016 (HDDS)



The five-year average (2012-2016) rate for emergency department visits due to asthma in children was five and a half times greater in black males compared to white males (3,502 vs. 642 per 100,000, respectively). Similarly, the five year average rate for emergency department visits due to asthma in children for black females was five times the rate for white females (2,143 vs. 427 per 100,000).

Emergency Department visit rate for asthma by race and gender, 1-17 year olds, Tennessee, 2012-2016 average (HDDS)

Summary

This report highlights the trends in asthma prevalence, health care utilization and costs among children in Tennessee. The data suggests improvements in certain indicators; for instance, in 2016, asthma prevalence among children in Tennessee was 5.9 percent, lower than other neighboring states. Other improvements include a decrease in the percentage of Tennessee mothers who smoked during pregnancy in 2016 from the prior year, and a decrease in pediatric inpatient hospitalizations for asthma from 2007 to 2016.

However, other indicators continue to experience no improvement or have worsened over time. Age, race and ethnic disparities in asthma prevalence, inpatient hospitalizations and emergency department visits continue to persist in Tennessee:

- ⇒ Asthma prevalence increased among TennCare enrollees.
- ⇒ Asthma prevalence was highest among the 5-10 year olds compared to those aged 1-4 and aged 11-17.
- ⇒ Males had a higher current asthma prevalence rate compared to females.
- ⇒ Per visit hospital charges for asthma have increased over 100 percent since 2007.
- ⇒ Males had higher inpatient hospitalization and emergency department visit rates than females.
- ⇒ Black children had higher inpatient hospitalization and emergency department visit rates than white children.

Asthma hospitalizations and emergency department visits are costly and may indicate severe and/or poorly controlled disease. Optimal asthma management, which includes knowledge about triggers, the development of an asthma action plan, regular communication with a primary care provider, and usage of medication as prescribed, can greatly improve the health of children with asthma, while decreasing hospital and emergency department usage.

This report indicates a need to continue asthma prevention and control efforts in Tennessee. The information contained in this report is important for the diverse groups of persons concerned with childhood asthma in Tennessee, and can be used to strategize efforts, to target interventions, and to evaluate efforts aimed at decreasing the burden of childhood asthma in Tennessee.

The Tennessee Department of Health recognizes air pollution causes health concerns such as asthma, allergies, lung cancer and other respiratory diseases. We work to reduce the number of teens and adults who smoke tobacco products putting their lung health at risk. We partner with the Tennessee Department of Environment and Conservation Division of Air Pollution Control, Tennessee Asthma Coalition, American Lung Association and other like-minded organizations to promote clean air. We educate people how indoor and outdoor air quality matters to their health. Tennessee's [HealthyHomes](#) website has information about asthma triggers, mold, carbon monoxide, radon and other air pollutants.

Technical Notes

Data Sources

National Survey of Children's Health (NSCH):

The NSCH is a constituent of the State and Local Area Integrated Telephone Survey, conducted by the National Center for Health Statistics. NSCH surveys the health condition, both physical and emotional, of children under age 18. The telephone statistical survey is conducted using a random digit dialing method for drawing a sample of households with children aged 0 to 17. Random-digit dialing gives accessibility to listed as well as unlisted telephones. One child is randomly selected from each household to be the subject of the survey. The interview questions are asked to the adult in the household who knows the most about the child's health and health care. The two questions used by NSCH to determine the asthma prevalence are "Has a doctor or health professional ever told you that [child's name] has asthma?" and "Does [child's name] currently have asthma?" Positive responses to the first question determined lifetime asthma, while positive responses to both questions determined current asthma.

To determine the prevalence of smoking in the household, NSCH used the question "Does anyone in the household use cigarettes, cigars, or pipe tobacco?" A positive response determined that the child's household included someone who smoked tobacco.

NSCH data were derived from the NSCH website: National Survey of Children's Health. NSCH 2016. Due to changes in data collection and sampling it is not possible to compare 2016 estimates with prior years.

Child and Adolescent Health Measurement Initiative. Data Resource Center for Child and Adolescent Health. 2016 National Survey of Children's Health (NSCH) data query.

Retrieved [01/08/18] from www.childhealthdata.org. CAHMI: www.cahmi.org

Hospital Discharge Data System (HDDS):

The Tennessee Hospital Discharge Data System (HDDS) was established for the purpose of having a state-based collection and summarization system of hospital claims data. Charges for similar types of services can be analyzed and compared to create a more price competitive environment in the medical market place. By Tennessee law, all hospitals licensed by the Tennessee Department of Health (TDH) are required to report patient-level discharge information to the Department.* Federal facilities (i.e. V.A. hospitals, etc.) are not included. The first listed ICD-9-CM code beginning with 493 or ICD-10-CM code beginning with J45 was used to identify asthma diagnoses. Data used were limited to the records of Tennessee residents. The terms "white" and "black" refer to persons of any ethnicity and the terms "Hispanic" and "non-Hispanic" refer to ethnicity regardless of race for HDDS. The analysis was limited to children 1 to 17 years of age because diagnosis of asthma is sometimes difficult among infants aged less than one year.

On October, 1st 2015 there was a transition from ICD-9 -CM to ICD-10-CM diagnosis coding, and differences after this change could be due to coding changes, which should be considered in interpretation of trends.

*Location map of acute care hospitals by county is on page 53.

Technical Notes

Data Sources

Birth Statistical System (BSS):

The data for the calculation of percent of mothers smoking during pregnancy was obtained from the Birth Statistical System, Tennessee Department of Health, Division of Vital Records and Statistics. Data were broken down by county and race of the mothers. Percent was not calculated when the number of births was less than ten. Total number of mothers smoking during pregnancy may include events with race other than white, black or race not stated.

Bureau of TennCare (TennCare):

Both enrollment and claims data are included in TennCare data. The number of TennCare enrollees aged 1-17 years from January 1, 2013 to December 31, 2015 was used as the denominator for the calculation of rates. The numbers of unique recipients who were enrolled in TennCare at any time during the specified time period were determined as the number of enrollees. The enrollee's age was calculated as of December 31, 2013. An asthma patient aged 1-17 years was defined as a child with any diagnosis of asthma in any TennCare medical claim file. Asthma diagnosis was identified using all ICD-9-CM codes in the medical claim file beginning with 493 or ICD-10-CM code beginning with J45. Data were broken down by county, gender and age group for enrollees and enrollees with asthma. No statistical tests were performed on TennCare data.

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Appendix A

Regional and County Hospital Discharge Data

The following tables present detailed data for asthma discharges for Tennessee counties and individual health department regions.[#]

Data presented are 2012 to 2016 annual averages for inpatient hospitalizations and emergency department visits with primary asthma diagnosis from the hospital discharge data system (HDDS). The rates calculated are per 100,000 population.

Metropolitan Region

County	Inpatient Hospitalizations		Emergency Department	
	Number	Rate	Number	Rate
Davidson	852	126	10,137	1,494
Hamilton	206	58	4,152	1,173
Knox	556	121	5,129	1,118
Madison	91	83	1,203	1,101
Shelby	1,853	165	22,369	1,996
Sullivan	147	100	940	641

East Region

County	Inpatient Hospitalizations		Emergency Department	
	Number	Rate	Number	Rate
Anderson	82	110	559	747
Blount	135	107	1,086	864
Campbell	30	76	290	734
Claiborne	28	94	185	622
Cocke	37	107	404	1,171
Grainger*	19	83	131	575
Hamblen	45	65	386	558
Jefferson	61	116	424	803
Loudon	36	76	327	692
Monroe	44	94	353	754
Morgan	24	118	116	571
Roane	62	126	401	816
Scott*	19	75	143	565
Sevier	96	102	883	938
Union	27	131	219	1,064
East Region	745	99	5,907	785

[#] Thirteen regions designated by the Tennessee Department of Health include seven rural and six metropolitan regions. See Appendix (page 51) for detailed Health Department region grouping and a map of the regions.

*Fewer than 20 Inpatient Hospitalizations and/or Emergency Department visits, results should be interpreted with caution.

Appendix A

Mid-Cumberland Region

County	Inpatient Hospitalizations		Emergency Department	
	Number	Rate	Number	Rate
Cheatham	29	66	373	853
Dickson	30	53	538	952
Houston*	**	82	88	1,030
Humphreys*	**	53	113	600
Montgomery	141	59	1,238	521
Robertson	55	69	764	959
Rutherford	222	64	2,623	756
Stewart*	**	45	36	269
Sumner	198	100	1,386	703
Trousdale*	**	81	90	1,039
Williamson	82	30	937	341
Wilson	88	61	728	508
Mid-Cumberland Region	875	61	8,915	574

Northeast Region

County	Inpatient Hospitalizations		Emergency Department	
	Number	Rate	Number	Rate
Carter	95	184	541	1,046
Greene	40	61	400	609
Hancock*	**	31	39	598
Hawkins	40	71	309	552
Johnson*	17	115	158	1,069
Unicoi*	18	110	155	949
Washington	150	125	1,397	1,169
Northeast Region	362	109	2,999	907

* Fewer than 20 Inpatient Hospitalizations and/or Emergency Department visits, results should be interpreted with caution.

**Data is suppressed when fewer than 11.

Appendix A

South Central Region

County	Inpatient Hospitalizations		Emergency Department	
	Number	Rate	Number	Rate
Bedford	45	78	463	806
Coffee	48	79	534	880
Giles	36	124	232	801
Hickman*	**	36	138	559
Lawrence*	14	28	151	306
Lewis*	**	49	29	234
Lincoln	33	92	287	803
Marshall*	19	55	248	712
Maury	81	86	690	728
Moore*	**	49	34	555
Perry*	**	49	40	494
Wayne*	**	56	58	405
South Central Region	306	72	2,904	680

Southeast Region

County	Inpatient Hospitalizations		Emergency Department	
	Number	Rate	Number	Rate
Bledsoe*	**	9	61	524
Bradley	71	65	645	586
Franklin*	13	31	201	480
Grundy*	**	29	63	455
McMinn	28	52	291	542
Marion*	**	25	196	690
Meigs*	**	70	70	611
Polk*	**	37	132	806
Rhea*	**	28	196	548
Sequatchie*	**	39	67	440
Southeast Region	154	46	1,922	533

* Fewer than 20 Inpatient Hospitalizations and/or Emergency Department visits, results should be interpreted with caution.

**Data is suppressed when fewer than 11.

Appendix A

Upper-Cumberland Region

County	Inpatient Hospitalizations		Emergency Department	
	Number	Rate	Number	Rate
Cannon*	**	37	92	672
Clay*	**	41	23	312
Cumberland	22	45	264	537
DeKalb*	**	55	142	708
Fentress	20	109	102	555
Jackson*	**	39	52	507
Macon	32	122	152	580
Overton*	**	26	112	482
Pickett*	**	110	12	264
Putnam	29	38	372	485
Smith*	**	43	168	794
Van Buren*	**	19	25	487
Warren	20	45	319	710
White*	**	33	150	553
Upper-Cumberland Region	176	51	1,985	570

* Fewer than 20 Inpatient Hospitalizations and/or Emergency Department visits, results should be interpreted with caution.

**Data is suppressed when fewer than 11.

Appendix A

West Region

County	Inpatient Hospitalizations		Emergency Department	
	Number	Rate	Number	Rate
Benton*	**	40	74	493
Carroll*	**	27	165	563
Chester*	14	73	75	393
Crockett*	**	48	88	530
Decatur*	**	35	67	589
Dyer	32	74	382	886
Fayette	43	112	443	1,156
Gibson	36	64	495	874
Hardeman*	19	78	542	2,223
Hardin*	13	51	131	519
Haywood	27	133	202	998
Henderson*	17	55	177	574
Henry	25	78	179	562
Lake*	17	304	112	2,005
Lauderdale	41	138	534	1,791
McNairy	20	73	147	533
Obion	40	125	267	836
Tipton	72	97	795	1,067
Weakley*	16	48	126	378
West Region	458	81	5,001	846

* Fewer than 20 Inpatient Hospitalizations and/or Emergency Department visits, results should be interpreted with caution.

**Data is suppressed when fewer than 11.

Appendix B

Regional and County Data: Charges, Race and Gender

The following tables present detailed data for inpatient and outpatient charges and emergency department visit rates by race and gender for Tennessee counties and individual health department regions. #

Data presented are 2012 to 2016 annual averages for discharges with primary asthma diagnosis.

Metropolitan Regions

County	Inpatient Charges (\$ Per Visit)	Outpatient Charges (\$ Per Visit)	ED Visits (per 100,000)			
			Female	Male	Black	White
Davidson	15,067	2,171	1,118	1,861	2,993	488
Hamilton	8,359	1,339	916	1,422	3,214	442
Knox	10,256	1,369	883	1,341	4,429	650
Madison	12,239	2,061	782	1,418	2,000	308
Shelby	23,421	2,818	1,511	2,467	3,019	361
Sullivan	10,609	1,775	544	734	1,823	604

East Region

County	Inpatient Charges (\$ Per Visit)	Outpatient Charges (\$ Per Visit)	ED Visits (per 100,000)			
			Female	Male	Black	White
Anderson	10,703	1,296	539	951	3,163	640
Blount	11,446	1,365	638	1,083	3,168	735
Campbell*	10,317	1,765	615	849	1,444	739
Claiborne	8,954	1,302	467	775	893	639
Cocke	12,133	1,989	1,133	1,207	3,621	1,095
Grainger*	8,412	1,830	554	595	3,797	527
Hamblen	9,989	1,855	472	642	1,211	458
Jefferson	13,405	1,909	713	890	1,957	757
Loudon	9,898	1,325	587	783	3,171	550
Monroe*	14,584	2,366	531	967	998	768
Morgan*	9,345	1,906	387	743	2,235	574
Roane	9,872	1,302	742	882	3,645	766
Scott*	10,551	1,386	376	748	4,762	559
Sevier	10,344	1,209	749	1,116	2,452	850
Union*	10,158	1,510	836	1,276	9,195	1,022
East Region	10,954	1,548	630	932	2,597	714

Thirteen regions designated by the Tennessee Department of Health include seven rural and six metropolitan regions. See Appendix (page 51) for detailed Health Department region grouping and a map of the regions.

* Fewer than 20 Inpatient Hospitalizations and/or Emergency Department visits, results should be interpreted with caution.

Appendix B

Mid-Cumberland Region

County	Inpatient Charges (\$ Per Visit)	Outpatient Charges (\$ Per Visit)	ED Visits (per 100,000)			
			Female	Male	Black	White
Cheatham*	12,647	1,821	614	1,073	2,038	810
Dickson	11,929	2,162	761	1,128	3,000	817
Houston*	8,979	1,430	1128	937	4,762	972
Humphreys*	11,875	1,765	594	606	2,724	524
Montgomery*	12,003	2,367	367	672	1,369	314
Robertson	13,183	2,463	741	1,172	3,768	608
Rutherford	12,948	2,231	586	920	1,927	434
Stewart*	12,275	1,658	222	311	345	279
Sumner	10,629	2,388	539	857	2,535	483
Trousdale*	10,574	2,676	722	1,332	1,599	880
Williamson	14,581	1,683	257	423	1,595	257
Wilson	13,156	3,064	378	631	1,512	406
Mid-Cumberland Region	12,349	2,272	475	766	1,862	431

Northeast Region

County	Inpatient Charges (\$ Per Visit)	Outpatient Charges (\$ Per Visit)	ED Visits (per 100,000)			
			Female	Male	Black	White
Carter	10,183	1,880	746	1,335	2,250	1051
Greene	8,981	1,492	482	726	1,220	585
Hancock*	42,064	1,604	358	811		614
Hawkins*	8,049	1,757	406	690	1,468	536
Johnson	14,196	1,123	761	1,364		1080
Unicoi*	9,332	1,639	585	1,287	1,064	784
Washington*	9,559	1,753	912	1,417	3,805	1008
Northeast Region	9,878	1,698	683	1,120	2,895	831

* Fewer than 20 Inpatient Hospitalizations and/or Emergency Department visits, results should be interpreted with caution.

Appendix B

South Central Region						
County	Inpatient Charges (\$ Per Visit)	Outpatient Charges (\$ Per Visit)	ED Visits (per 100,000)			
			Female	Male	Black	White
Bedford	11,357	2,315	662	943	2,089	663
Coffee	11,263	2,290	655	1,092	3,528	758
Giles	12,285	2,306	795	806	2,152	648
Hickman*	30,090	2,301	438	669	1,792	496
Lawrence*	9,554	2,499	171	434	1,054	293
Lewis*	10,727	1,970	237	232	890	217
Lincoln	9,657	1,626	591	1,005	1,524	753
Marshall	18,090	1,074	593	823	2,625	587
Maury	11,975	2,136	539	907	2,519	460
Moore*	11,571	2,436	484	628	4,918	464
Perry*	16,153	1,518	390	589	450	509
Wayne	8,271	1,958	455	359		424
South Central Region	12,290	2,081	536	815	2,305	550

Southeast Region						
County	Inpatient Charges (\$ Per Visit)	Outpatient Charges (\$ Per Visit)	ED Visits (per 100,000)			
			Female	Male	Black	White
Bledsoe*	4,314	1,577	383	650	521	508
Bradley	10,315	2,858	390	774	1,835	506
Franklin	7,474	1,944	431	529	1,028	445
Grundy	4,134	1,844	418	487	.	460
McMinn	11,539	2,297	379	697	1,986	479
Marion*	11,534	1,438	520	846	1,310	641
Meigs*	11,262	2,512	466	758	424	636
Polk*	10,414	1,842	734	873	505	829
Rhea*	8,107	1,041	469	625	749	534
Sequatchie	10,369	1,444	409	471	.	424
Southeast Region	10,065	2,128	433	696	1,505	524

* Fewer than 20 Inpatient Hospitalizations and/or Emergency Department visits, results should be interpreted with caution.

Appendix B

Upper Cumberland Region

County	Inpatient Charges (\$ Per Visit)	Outpatient Charges (\$ Per Visit)	ED Visits (per 100,000)			
			Female	Male	Black	White
Cannon*	19,270	1,525	676	668	1,322	667
Clay*	5,973	2,411	241	385		329
Cumberland*	10,283	1,729	318	744	664	532
DeKalb*	10,274	2,011	457	940	1,607	648
Fentress	11,468	2,757	372	725		554
Jackson*	7,140	1,964	372	626		525
Macon	8,967	2,121	453	705		568
Overton*	13,127	1,743	340	612	2,283	469
Pickett*	8,740	1,787	142	371		268
Putnam	8,094	1,401	404	562	1,895	455
Smith	10,812	2,729	703	880	4,412	682
Van Buren*	8,590	1,580	280	682		500
Warren	11,431	2,340	558	855	1,448	600
White*	10,386	1,672	420	681	1,413	539
Upper Cumberland Region	10,134	1,950	433	700	1,595	537

* Fewer than 20 Inpatient Hospitalizations and/or Emergency Department visits, results should be interpreted with caution.

Appendix B

West Region

County	Inpatient Charges (\$ Per Visit)	Outpatient Charges (\$ Per Visit)	ED Visits (per 100,000)			
			Female	Male	Black	White
Benton*	6,888	1,397	303	672	1,909	474
Carroll	9,433	2,416	460	659	1,873	404
Chester	10,930	2,098	294	491	1,262	301
Crockett	28,573	2,105	541	519	1,450	323
Decatur*	6,521	1,116	420	744	1,739	515
Dyer	17,234	4,480	600	1,156	2,210	581
Fayette	22,350	2,415	976	1,322	2,362	537
Gibson	13,587	1,750	727	1,018	2,160	515
Hardeman	11,473	1,645	2,103	2,345	4,018	665
Hardin*	8,656	1,872	461	576	1,192	494
Haywood	11,879	2,067	819	1,178	1,543	361
Henderson	7,781	2,531	515	632	2,107	448
Henry	9,475	2,058	473	647	2,431	379
Lake	24,275	5,545	1,239	2,627	4,360	1,292
Lauderdale	21,523	2,050	1,321	2,247	3,375	705
McNairy	17,511	3,050	369	686	2,058	429
Obion	8,327	2,674	677	991	2,501	585
Tipton	19,679	2,267	897	1,227	2,922	593
Weakley	14,725	3,365	354	402	973	315
West Region	15,671	2,387	722	1,039	2,512	498

* Fewer than 20 Inpatient Hospitalizations and/or Emergency Department visits, results should be interpreted with caution.

Appendix C

Regional and County TennCare Data

The following table presents detailed regional and county level TennCare data for childhood asthma (children aged 1 to 17 years).[#]
TennCare prevalence data are for 2014 to 2016.

Metropolitan Regions

County	Prevalence by Gender (%)		Prevalence (%)
	Female	Male	Enrollees
Davidson	13.5	17.9	15.7
Hamilton	21.2	26.0	23.6
Knox	13.8	17.1	15.5
Madison	11.9	16.9	14.4
Shelby	12.8	16.9	14.8
Sullivan	15.3	19.1	17.2

East Region

County	Prevalence by Gender (%)		Prevalence (%)
	Female	Male	Enrollees
Anderson	13.3	16.2	14.8
Blount	11.6	13.6	12.6
Campbell	11.7	15.0	13.4
Claiborne	15.7	16.9	16.3
Cocke	18.1	21.1	19.6
Grainger	12.8	14.2	13.5
Hamblen	11.2	14.6	12.9
Jefferson	14.7	15.6	15.2
Loudon	9.1	12.5	10.8
Monroe	10.0	13.4	11.8
Morgan	11.2	15.3	13.3
Roane	13.9	16.4	15.3
Scott	12.4	14.9	13.6
Sevier	12.1	14.3	13.2
Union	14.6	19.2	16.9
East Region	12.6	15.2	14.0

[#] Thirteen regions designated by the Tennessee Department of Health include seven rural and six metropolitan regions. See Appendix (page 51) for detailed Health Department region grouping and a map of the regions.

Appendix C

Mid-Cumberland Region

County	Prevalence by Gender (%)		Prevalence (%)
	Female	Male	Enrollees
Cheatham	13.2	15.9	14.6
Dickson	15.2	19.4	17.3
Houston	9.7	15.3	12.6
Humphreys	16.8	19.7	18.3
Montgomery	12.8	16.8	14.8
Robertson	20.5	25.9	23.2
Rutherford	11.5	14.8	13.2
Stewart	8.9	12.2	10.5
Sumner	13.1	16.7	15.0
Trousdale	8.4	15.9	12.2
Williamson	9.2	13.1	11.2
Wilson	11.9	14.6	13.3
Mid-Cumberland Region	12.8	16.5	14.7

Northeast Region

County	Prevalence by Gender (%)		Prevalence (%)
	Female	Male	Enrollees
Carter	16.7	19.9	18.3
Greene	17.3	20.5	18.9
Hancock	10.4	13.8	12.2
Hawkins	13.5	16.6	15.1
Johnson	12.8	16.0	14.4
Unicoi	11.8	16.3	14.1
Washington	16.3	20.9	18.6
Northeast Region	15.5	19.1	17.4

Appendix C

South Central Region

County	Prevalence by Gender (%)		Prevalence (%)
	Female	Male	Enrollees
Bedford	12.4	16.7	14.6
Coffee	14.4	16.4	15.4
Giles	12.8	15.7	14.2
Hickman	12.8	14.3	13.6
Lawrence	8.3	12.7	10.6
Lewis	8.4	11.1	9.8
Lincoln	11.8	14.2	13.0
Marshall	10.2	13.8	12.0
Maury	13.8	16.7	15.3
Moore	14.9	12.9	13.8
Perry	8.1	10.1	9.1
Wayne	8.8	10.8	9.8
South Central Region	12.0	15.0	13.5

Southeast Region

County	Prevalence by Gender (%)		Prevalence (%)
	Female	Male	Enrollees
Bledsoe	14.2	17.8	16.2
Bradley	12.5	16.8	14.7
Franklin	14.7	19.0	16.9
Grundy	14.1	15.4	14.8
Marion	17.7	23.1	20.4
McMinn	13.0	16.9	15.0
Meigs	10.9	17.7	14.4
Polk	15.4	17.7	16.5
Rhea	14.2	16.2	15.2
Sequatchie	21.0	21.0	21.0
Southeast Region	14.1	17.8	16.0

Appendix C

Upper-Cumberland Region

County	Prevalence by Gender (%)		Prevalence (%)
	Female	Male	Enrollees
Cannon	7.8	13.3	10.7
Clay	7.3	9.0	8.2
Cumberland	10.9	16.3	13.7
Dekalb	9.4	13.5	11.5
Fentress	11.5	13.8	12.7
Jackson	10.6	13.7	12.2
Macon	8.8	12.9	10.9
Overton	8.1	11.8	10.1
Pickett	11.2	11.2	11.2
Putnam	9.6	12.3	11.0
Smith	11.2	15.9	13.6
Van Buren	6.4	11.1	8.9
Warren	11.6	12.4	12.0
White	8.1	11.4	9.8
Upper-Cumberland Region	9.9	13.2	11.6

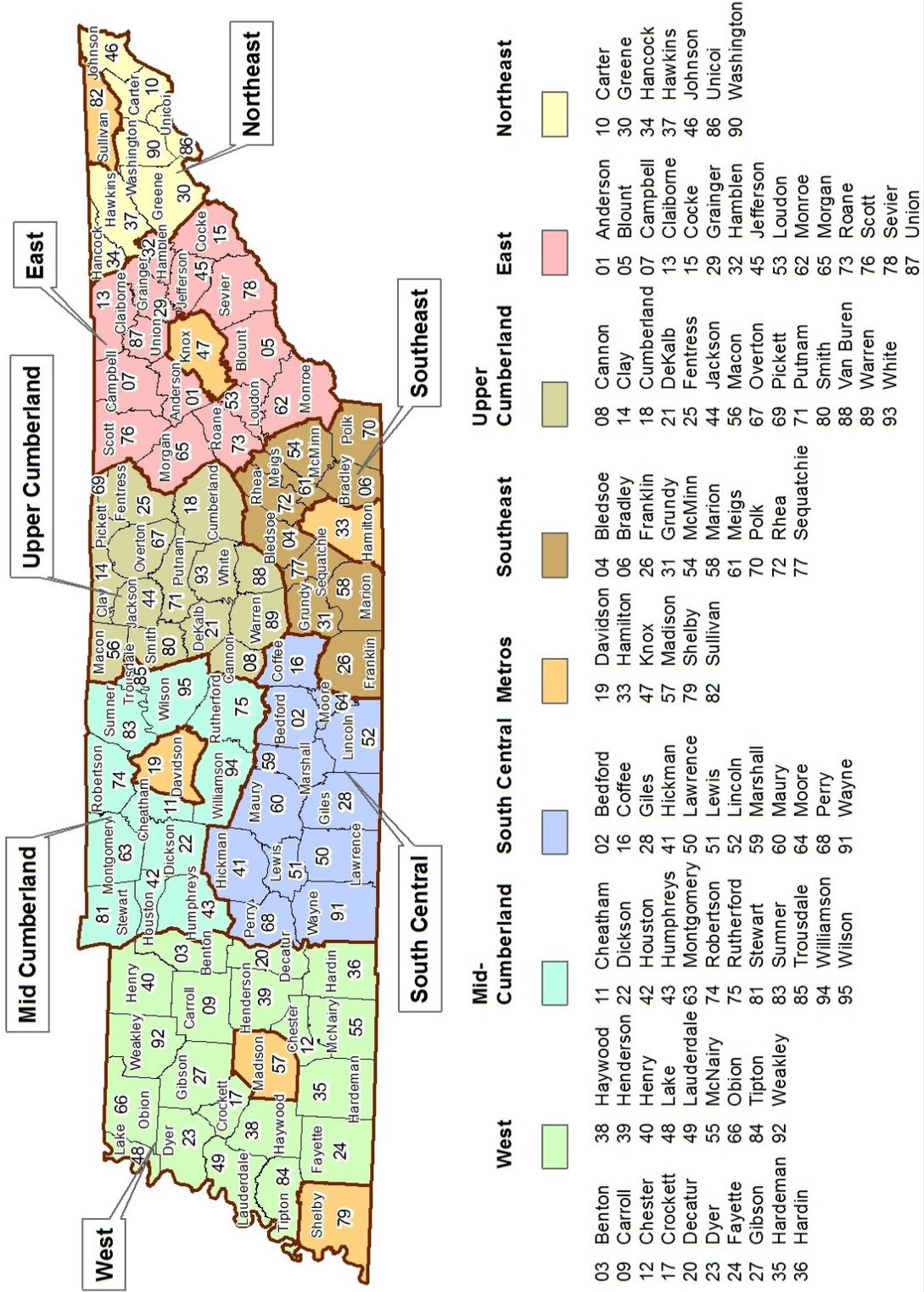
Appendix C

West Region

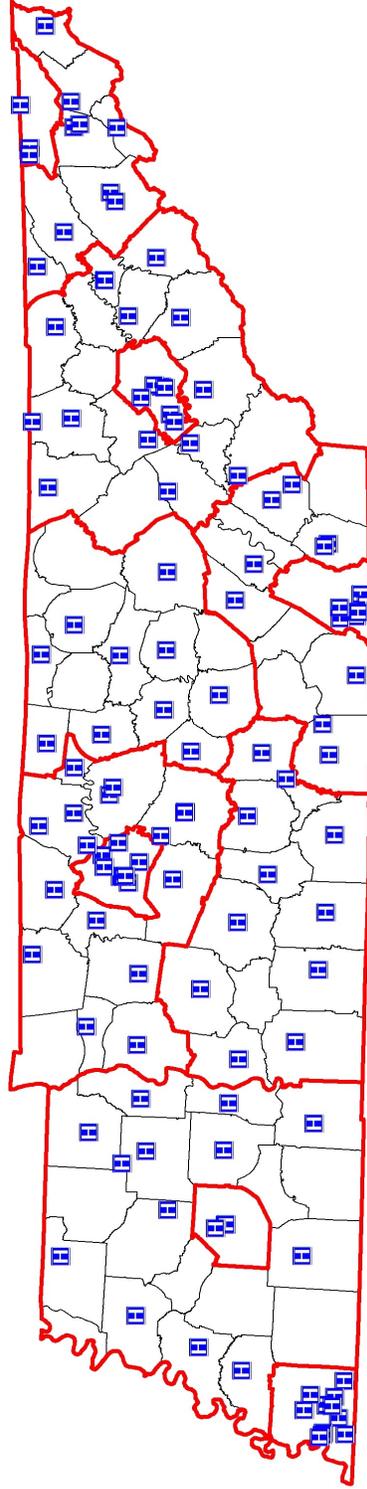
County	Prevalence by Gender (%)		Prevalence (%)
	Female	Male	Enrollees
Benton	10.6	13.1	11.9
Carroll	10.0	14.5	12.3
Chester	10.5	11.8	11.1
Crockett	7.9	11.7	9.8
Decatur	8.7	12.8	10.9
Dyer	11.9	15.9	13.9
Fayette	13.6	19.5	16.6
Gibson	13.9	15.3	14.6
Hardeman	21.9	24.9	23.4
Hardin	12.6	17.6	15.2
Haywood	12.8	14.5	13.7
Henderson	11.0	13.1	12.1
Henry	13.2	18.1	15.7
Lake	14.6	16.9	15.8
Lauderdale	11.6	16.9	14.3
McNairy	12.8	15.4	14.2
Obion	8.3	12.3	10.3
Tipton	13.6	16.9	15.3
Weakley	10.0	14.3	12.2
West Region	12.3	15.9	14.2

Maps

Tennessee Counties and Health Department Regions



Tennessee Acute Care Hospitals by County, 2018



Map produced by Division of Population Health Assessment; Tennessee Department of Health

